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THE Journal OF AGRICULTURE

IMPERIAL MYCOLOGICAL INSTITUTE
25 APR. 1940

VOL 60
No 2

FEBRUARY

1940

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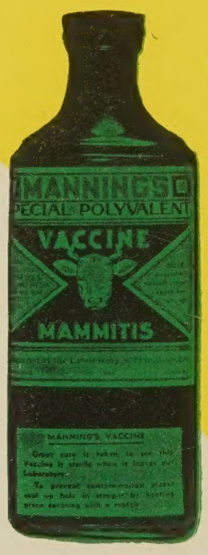

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Vol. 60 WELLINGTON, FEBRUARY 15, 1940. No. 2

Feed Requirements of Stock

How To Assess The Nutritive Value Of Foodstuffs

I. J. CUNNINGHAM, Chief Biochemist, Animal Research Station, Wallaceville.

THE food consumed by animals is their sole source of raw materials for fulfilment of the many and varied needs of their existence. It is the fuel which can be burned to produce energy for all movements, such as those of walking about, of collecting and masticating food, of passing food along the digestive tract, or even of flicking a tail or an ear or blinking an eyelid. Food must supply all materials for maintenance of tissues in a healthy condition, and must provide also for the repair and replacement that must regularly go on.

This repair may be clearly evident, as in the case of healing of a surface abrasion, or it may be the unseen, but periodic replacement of aged and worn-out body tissues, such as effete blood corpuscles or muscle fibres. Again, food must supply all the materials necessary for growth; thus, it must provide minerals for bone formation, proteins for muscle formation, and so on.

Net energy values provide the animal husbandmen with the logical basis for a comparison of the relative costs of purchased foodstuffs when the foodstuffs are of the same class. This article provides a guide to the farmer who intends buying supplementary feed for his stock.

Finally, food is the only raw material for the production by domestic animals of the large quantities of meat, milk, wool, eggs, etc., which are regularly harvested, and which constitute the wealth of an agricultural community.

This great diversity of uses complicates the problem of measuring the nutritive values of different foodstuffs and reducing them to a common basis so that direct comparisons may be made between one food and another. A direct comparison of any real value can, in fact, be made only between foods of the same class, such as, for example, between cereals or between hays, or between protein concentrates such as meat meals and fish meals. Even then, the value of a particular food can be properly assessed only when the other constituents of the ration are known and when the purpose for which the ration is being fed is considered.

Maintenance and Production

Although food must fulfil so many functions in the animal body, it is possible to divide food requirements into two main sections, namely, food required for maintenance, and food required for production. By maintenance food or **MAINTENANCE RATION** is understood the minimal amount of foodstuff that must be supplied to keep the body of a resting

animal in equilibrium so that there is neither loss nor gain in weight, but yet so that normal functioning is not impaired. By **PRODUCTION RATION** is understood the food that must be provided, over and above that necessary for maintenance, for the special objective for which the animal is kept. This objective may be growth, as in the raising of young stock to maturity; it may be fattening, as in the fattening off of adult stock for the butcher; it may be work, as in the use of horses for draught; it may be milk, as in the feeding of dairy cows; or it may be eggs, as in the feeding of poultry, and so on.

Individual foods or combinations of foods may possess special virtues in the productive section of a ration. A product rich in protein, for example, would require a ration providing ample of this material, whereas a product rich in fat is better achieved from a ration rich in carbohydrate. This last may not at first sight be readily understandable until it is realised that the animal can convert carbohydrate into fat and store this fat in its body.

Mention has been made of the different chemical constituents of foodstuffs, and it may be helpful to give some general description of these different constituents. Essentially, a desirable ration is composed of foodstuffs which provide sufficient weight and bulk and due quantities of protein, carbohydrates, fats, vitamins, minerals, and water. The art of the animal husbandman is to compound such a ration and present it to the animal in a palatable form.

Importance of Weight

Weight is probably one of the most important features of a ration, as this is the measure of the total raw material allowed. Obviously, unless there is sufficient quantity, partial starvation will result no matter what the quality of the food may be. The first requisite of a ration must therefore be that it provides sufficient weight of food.

It is now generally recognised that animals require daily from between two-fifths to one-half an ounce of dry-weight of food per lb. of live weight. This would correspond to about 25 to 35lb. of dry-weight of food daily per 1000lb. live-weight in cattle, and for pigs and sheep about 2½ to 3½lb. dry-weight of food daily per 100lb. live-weight. **It is important to note dry-weight of food, and to remember that a succulent pasture may contain 80 to 85 per cent. of water.** Its content of dry food is therefore only 15 to 20 per cent., and a correspondingly greater weight of green food would necessarily be required to supply sufficient dry-weight of food.

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Bulk must also be considered along with dry-weight intake. There is a definite limit to the capacity of the stomachs of animals, and when this limit of storage is reached no further ingestion can occur until space is made by digestion of some of the food already there. With very bulky foods, or those which swell markedly after being swallowed, the limit of appetite may be reached before the needs for dry-weight of food have been satisfied. This is important in high-producing animals whose demands for food are high to meet the production requirements. A certain amount of bulk is desirable as an aid to the normal movements of the digestive tract.

Need of Proteins

Protein is the name applied to a special class of chemical compound which is a characteristic component of living tissue. Not all proteins are exactly the same. There is, in fact, very great variation between proteins when their efficiency as foodstuffs is considered. Protein is required in the diet to make good the loss of tissues, to fulfil requirements for the manufacture of many special secretions employed in the ordinary processes of metabolism within the body, and to supply the necessary units for the production of protein-containing materials, such as milk and eggs.

The protein requirement for maintenance of cattle of 1000lb live-weight is approximately two-thirds of a pound of digestible food protein daily, and for other classes of stock an amount bearing approximately the same proportion to the live-weight of the animal. The need for protein increases as the production increases, and in a milking cow it is necessary to supply in addition a little over half a pound of digestible protein for each gallon of milk. A cow producing four gallons of milk daily would then need nearly 3lb. of digestible protein in its food. The significance of the term digestible will be made clear later on.

Sources of Energy

Carbohydrate is the main source of energy in a ration, and is also largely the source of material from which fat is formed. Adequate carbohydrate will be present if sufficient weight of ration is supplied and if the ration is composed of good materials.

Fat is another source of energy, although this is not its sole function in a ration. It cannot, for example, be entirely replaced by carbohydrate without ill-health developing in stock. The necessary minimal amount is present in most foodstuffs, although this is not readily apparent. Even pasture grass contains about 1 per cent. of fatty substances. In the fat, moreover, are dissolved some of the important vitamins, notably vitamins A and D.

Vitamins are now familiar to nearly everyone, and the effects of their deficiency are commonly discussed. For farming stock there is little need for concern while the animals are allowed natural foods. Sheep, cattle, and pigs running freely on good pasture are unlikely to suffer from a deficiency. Trouble might be experienced under certain conditions of restricted quarters and lack of natural variety of foods as, for example, pigs kept in dark pens and fed only skim milk. Such considerations are beyond the scope of this article, and it would be confusing and unnecessary to detail the specific functions of the individual vitamins. It is desirable to stress, however, that vitamins are essential and important foods, most of which must be present in the food in minute quantity.

Minerals

Minerals form a small but none the less important fraction of the food. Somewhere in the region of 5 per cent. of the dry-weight of foods is mineral matter, and a great variety of different minerals is present. Thirteen different mineral elements are at present known to be essential to animal life, but the amounts necessary vary widely. Minerals such as lime and phosphorus are required in comparatively large quantity, while, on the other hand, so-called trace minerals, such as cobalt, are required only in minute amount. A high percentage of the skeleton and a relatively small percentage of the soft tissues is mineral matter, and minerals participate in many and varied ways in the reactions that go on in the living body. It is important that a suitable quantity and a full complement of minerals be present in the diet.

Of all constituents of the living body, water is present in the greatest proportion. About 60 to 70 per cent. or more of all living animals is water and in the course of a day large volumes are used in the digestion of foods, in transmission of digested food to various points within the body, and in the elimination of waste products. No diet can be complete unless due consideration is given to the water requirements.

Such is a very brief and sketchy account of the requirements a ration must fulfil and what needs must be taken into account in assessing the

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nutritive properties of a feeding stuff. It would seem that chemical analysis might be an extremely useful aid in showing the constituents present in a food and the proportions in which they occur. To a limited extent chemical analysis is useful, and the limitations will be discussed more fully later on. Another even more useful measurement of a food is its energy-content.

Measurement of Energy

Speaking very broadly, the energy-content of any substance is its power to do work. Everyone is familiar with the conception that petrol contains energy and that, by burning it in an engine, work can be done. Similarly, food also contains energy, for animals are able to burn up food to perform work. It may not be so familiar a fact that the energy contained in such substances is capable of very accurate measurement. This, however, is true, for when energy is dissipated it is converted into heat, and accurate measurement of heat is readily accomplished.

Energy, then, may be stated in terms of heat. The unit of measurement of heat is the calorie, which represents the amount of heat that is required to raise one gram of water through one degree centigrade. The unit applied to the measurement of energy of a feeding stuff is the therm, which is one million calories. The therm was adopted for simplicity in recording, as it is much easier to record a few figures than a large number.

Two conceptions of a food have now been developed. First, that it is a mixture of chemical substances, and second, that it is a store of energy. We know that chemical transformations occur in the food during its metabolism by an animal, for we feed one substance, for example, grass, and collect an entirely different product, for example, milk. It is possible to follow the transformation and to learn how much milk is yielded from so much food. Equally so is it possible to follow the transformation of energy and with great accuracy and precision.

The energy-content of a food is a very convenient measure of its value, because it expresses the total value as one figure instead of in a series of figures, as is the case in a chemical analysis. The two methods are both necessary, however, because energy does not differentiate between the different constituents, all of which, as was explained earlier, have their specific functions to fulfil. The energy-content, however, enables a rapid comparison to be made between foods.

Limitations of Animal

So far we have been dealing with the food alone and have not considered the limitations of the animal in dealing with the foodstuff. The nutritive value of any material is governed entirely by the ability of the animal to convert that material to its own needs. After ingestion a foodstuff must be subjected to complicated processes of digestion, absorption, and transformation before it is in a state suitable for use by the body cells. Certain losses occur during these processes, and the nutrient value of a foodstuff to the animal is unavoidably reduced by the exact extent of these losses. The total loss varies for different feeding stuffs and for the same feeding stuff when

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by

H. G. PHILPOTT, Dairy Division, Department of Agriculture.

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metabolised by different species of animals.

The causes of loss always are three:—

(1). Part of the food is not digested.

(2). During digestion and during metabolism part of the food is transformed into materials which cannot be utilised by the animal and which are excreted.

(3). All foods, to a different degree, stimulate vital processes. This stimulation is not observed by the eye, but nevertheless it results in the dissipation of energy in the same way as does muscular movement.

These three points require a little elaboration to make clear just why each constitutes a loss to the animal.

Process of Digestion

The term "digestibility" is used in animal nutrition in a special sense to mean the percentage of feed which is extracted during its passage through the alimentary tract. It should be realised that the ingestion of a food does not mean that is is then all utilised by the animal. While food is in the alimentary tract it is merely conveniently placed for action by digestive processes. Only the part which is digested and absorbed is utilised by the animal. The undigested portion is passed on and eliminated in the faeces, and is a total loss so far as metabolism is concerned. The undigested residue can readily be measured by collecting the faeces under suitably controlled conditions.

The practice in the determination of digestibility is to feed the same weight of food daily over a long period and to collect the faeces for this period. The difference between the food intake and the faecal outgo is considered as the digested portion. The digestible portion can be expressed as a percentage of the total food intake. It is apparent, also, that by chemical analyses of food and of faeces the percentage digestibility of any of the food constituents, such as proteins, carbohydrates, fats, etc., can be measured.

Digestibility

It was stated earlier that digestibility varies for different foodstuffs and for the same foodstuff fed to different species of animal. A sheep, for example, can digest 55 per cent. of the total dry-matter of hay, but can digest nearly 90 per cent. of the total dry-matter of maize. A fowl can digest only about 30 per cent. of clover, but digests about 80 per cent. of wheat. A sheep will digest more than 40 per cent. of wheat chaff, whereas a pig will digest only approximately 20 per cent. of this same substance.

A knowledge of digestibility of a foodstuff is obviously of first importance in assessing its nutritive properties. Attempts have been made to use the percentage digestibility or, as variously expressed, the **DIGESTIBLE NUTRIENTS** or the **GROSS DIGESTIBLE ENERGY** as a measure of nutritive property of foods. Such a procedure neglects the two remaining causes of loss which were indicated earlier.

During digestion, especially by cattle, a gas known as methane is formed as an inevitable consequence of the processes of fermentation. Methane contains energy which was present in the original food, but which cannot be utilised by the animal. The loss of methane, therefore, is a direct loss from the food. When some foods are fed to cattle and sheep this loss reaches or exceeds 10 per cent. of the total food energy, although it is usually 8 per cent. or less. In horses the loss is usually less than 2 per cent., and in pigs less than 1 per cent.

In addition to the loss due to gas formation, further loss occurs due to the fact that there are excreted in the urine certain substances which are incompletely oxidised. The loss by way of the urine is frequently in the region of 5 per cent. of the total food energy. The **GROSS DIGESTIBLE ENERGY**, therefore, does not represent the nutritive value of a food, because the losses which have just been described must be subtracted before the nutrients available to the animal can be computed.

Metabolisable Energy

The nutrient value of a food after subtraction of the undigested matter and the losses due to gas formation and excretion in the urine is defined as **METABOLISABLE ENERGY** of the food. This metabolisable energy is the fraction which is finally left for the use of the animal.

But not yet all the metabolisable energy is available to the animal for production purposes or for the provision of maintenance requirements, because the third cause of loss has yet to be allowed for. This loss is due to the stimulating effect of the food on the body cells. Energy is used by this stimulation, and must be debited to the food which causes the stimulation. The energy used up is converted to heat, and is eliminated from the body in this form. The fraction of the energy lost by this heat formation is a direct loss to the body for production, although the heat can be employed in maintaining the body temperature. Losses of from 17 per cent. to nearly 40 per cent. of the total energy of the foodstuff may occur as a result of this stimulation.

Net Energy

What is left to the animal after the three losses have been deducted is the proportion of the food available for maintenance or for production purposes. It is defined as the **NET ENERGY** of the food. For ruminants the net energy of roughages may vary from 5 per cent. of the total energy for wheat straw to 24 per cent. for clover hay; for concentrates it may vary from 30 per cent. for wheat bran to 50 per cent. for molasses.

The net energy of a food can be measured only by actual experiment on animals. The methods employed are highly technical, and a description of these is beyond the scope of this article. It will suffice to say that in the measurement all the losses which occur during metabolism of a foodstuff and which were described earlier are properly allowed for. The net energy, then, is the net value of the foodstuff to the animal.

The unit for stating net energy is the therm, and the practice is to give the number of therms of net energy per 100lb. of foodstuff. Thus, for ruminants the net energy of wheat straw is 7 therms per 100lb. and of hay is 40 therms per 100lb.

Starch Equivalent

The therm has not yet been adopted universally as a means of expressing net energy, mainly because of the difficulty sometimes experienced in applying an abstract conception like a therm to the rationing of stock. An older measure of net energy will, therefore, often be encountered. This measure is the **STARCH EQUIVALENT.**

The starch equivalent is the number of pounds of starch which yield the same net energy to the animal as do 100lb. of the food.

The reason for selecting starch as the standard of reference was that it was a familiar substance, and therefore easily visualised. The net energy of pure starch for cattle was found by

experiment to be 107.1 therms per 100lb. or 1.071 therms per lb. Starch equivalent for cattle may, therefore, be converted to therms per 100lb. by multiplying by 1.071, and, conversely, therms per 100lb. may be converted to starch equivalent by dividing by 1.071. The two methods of expressing net energy bear a simple relation to each other.

In a small table at the end of this article figures are quoted from a publication issued by the Ministry of Agriculture of Great Britain and entitled "Rations for Livestock." Starch equivalent is used in this publication, and the significance to be attached to the figures for starch equivalent is that described above for net energy.

Basis for Relative Costs

It must be repeated that the value for net energy is a summation of the nutritive values of all the constituents of the foodstuffs. It does not differentiate between the protein, or the carbohydrate, or the fat, etc. Neither does it indicate in any way the palatability of the food to different classes of stock, nor the particular value that some foodstuffs have been shown by experience to possess for the nutrition of certain species of animal. In spite of this, however, net energy values provide the animal husbandman with a logical basis for comparison of relative costs of purchased foodstuffs when these foodstuffs are of the same class.

For instance, all cereal grains have much the same chemical composition; they are rich in carbohydrates and contain similar percentages of protein. In other words, they are carbohydrate concentrates, and are more or less interchangeable in a ration.

The question might well arise as to whether it is cheaper to buy barley or oats. For example, say barley is quoted at 4s 6d per bushel (50lb.) and oats at 4s per bushel (40lb.). The cost per 100lb. is then 9s for barley and 10s for oats. The net energy is 71.4lb. starch equivalent for barley, and 59.5lb. starch equivalent for oats. The cost per 1lb. of starch equivalent as barley is 1.51d, and for 1lb of starch equivalent as oats is 2.03d. It would, therefore, be cheaper to buy barley, even though the price paid per bushed is higher.

In the great majority of cases food will be purchased because there is not sufficient food on the farm to meet the requirements of the stock. In these circumstances the requirement in the purchased food is primarily its energy-content, and the cost of different foods should then be assessed by calculating the cost per lb. of starch equivalent as shown above.

In other cases there may be ample energy-containing foods produced on the farm, but a lack of a special food constituent may occur. This food constituent may be, for example, protein, or even vitamins A and D. In such circumstances the value of the food to be purchased could not be assessed from its content of net energy, but only by its content of the desired constituent. In the particular case where protein was to be purchased the cost per lb. of digestible food protein would be the unit selected for comparison of costs of different foods. In the case of vitamins A and D the unit for comparison would be the content of these vitamins guaranteed by the makers to be contained in the material (cod-liver oil) offered for sale.

These are special circumstances, however, and it should be realised that net energy as starch equivalent is the best basis for comparison. For interest, the contents of digestible proteins are given together with the starch equivalents of the foodstuffs shown below.

NUTRITIVE VALUES OF FEEDING STUFFS (QUOTED FROM "RATIONS FOR LIVESTOCK.")

Feeding Stuff	Dry Matter Per Cent.	Content of Digestible Crude Protein Per Cent.	Content of Net Energy as Starch Equivalent.
Bran	87.0	10.9	42.6
Pollard	86.0	11.6	56.5
Barley	85.1	7.6	71.4
Wheat	86.6	10.2	71.6
Oats	86.7	8.0	59.5
Maize	87.0	7.9	77.6
Molasses	74.2	1.1	50.6
Meat-meal	89.2	67.2	91.0
Linseed cake	89.0	27.8	74.5
Lucerne hay (before flowering)	84.5	12.1	32
Very good quality hay	84.0	9.2	48

Feeding of Bran to Dairy Stock

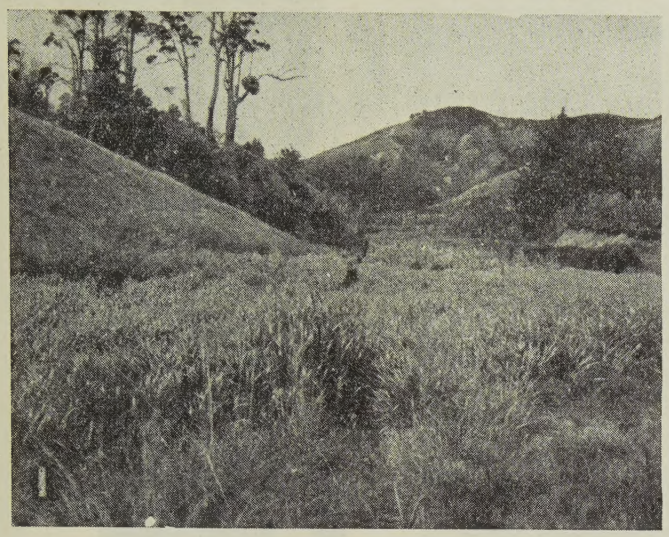
At one of the meetings of the National Council of Primary Production, Mr. W. E. Hale, Chairman of the New Zealand Dairy Board, asked for information concerning the feeding of bran to dairy stock. The following brief report is based on information supplied by the Livestock Division, Department of Agriculture.

Bran, a bulky food, is rich in protein and phosphorus and by virtue of its helpful action on the bowels is frequently given to newly-calved and sick cows. Scottish reports state that bran has a corrective influence on the unduly laxative tendency of young grass. Bran would be fed dry to obtain such a result.

Three local town-supply dairymen using bran for feeding dairy cows report very favourably on it for maintaining both production and health. Rate of feeding varied from 2 lbs. per day to 6 lbs. along with other concentrates. Such feeding, however, could only be adopted where the higher-priced market milk is being produced.

In the Waikato several reports from farmers indicate that bran is being fed in small amounts for three or four weeks after calving with apparently much less of the general after-calving troubles. Other Waikato reports indicate that small quantities of bran, fed with crushed oats and moose-nuts, bring yearling heifers through the winter in improved condition. The cost of this feeding is about 6s per head.

The cost of feeding bran at the rate of 3 lbs. a day for 28 days with bran at £6 per ton would be about 4s 6d per cow. It is doubtful whether the immediate increased production would be very appreciable, but there seems no doubt that there would be an improvement in health and, in consequence, a longer flush of production.



Extremes in the battle for survival. *Fig. 1.*—A pure sward of *Poa aquatica* in the bed of a creek. *Fig. 2.* A pure sward of danthonia on an exposed hill face. The extremely wet conditions in Fig. 1 so favoured the *Poa aquatica* that it has taken complete possession to the exclusion of all other species. Similarly, danthonia, because of its low fertility requirements and its ability to grow on exposed faces, has defeated all-comers and has built up a pure danthonia sward.

Selecting A Seeds Mixture

Part Played by Existing Conditions In Deciding the Blend

P. S. SYME, Instructor in Agriculture, Warkworth.

THE method of selecting a seeds mixture has been a highly controversial subject of discussion for 200 years or more. During that period much has been learned regarding the requirements of the various species of grasses and clovers, and of their respective behaviour when growing either as competitors or as co-operating partners in the production of a high-producing pasture sward. While the earlier mixtures were compounded largely on the system adopted by the old-fashioned doctor—namely, including a little of everything likely to do the patient good—the modern seeds mixture is very carefully designed, and takes full account of many factors undreamed of by the farmer of even a generation ago.

The scientific study of pastures has now shown that, quite apart from the actual mixture sown, the species ultimately found in any sward tend to be represented according as conditions suit their establishment, growth, and reproduction. From the day the seed is sown, life for the developing plant is a continuous fierce battle for survival, and only those species whose requirements are best suited to existing conditions can hope to persist.

What is the best seeds mixture for your farm? Only those species whose requirements are best suited to existing conditions can hope to persist in the continuous fierce battle for survival, and it is a wise farmer who gives very careful consideration to certain vital factors when compounding a seeds mixture.

Certain of the factors which favourably or adversely affect the growth of the various species can to some extent be modified or controlled, to the great advantage of the pasture, and, for this reason, very careful consideration should be given to certain vital factors when compounding a seeds mixture.

Standard of Fertility

From a practical viewpoint, probably the most important single consideration in deciding on the suitability of any particular species is its requisite standard of fertility. It is well understood by most farmers that the different species of pasture plants make widely varying nutritive demands on the soil. Some, such as ryegrass, will not thrive or persist unless the fertility is high, while others, such as browntop, will succeed on poor soils. Paspalum is highly adaptable, and will persist on poor soil or on rich soil. Its production, however, tends to be proportionate to the soil fertility.

The more common species of pasture plants may be grouped according to their fertility demands in approximately the following order:—Meadow foxtail, timothy, alsike, red clover, Italian ryegrass, perennial ryegrass, white clover, paspalum, Yorkshire fog, cocksfoot, crested dogstail, strawberry clover, browntop, *lotus major*, subterranean clover, sweet vernal, *danthonia pilosa*, ratstail, Chewings fescue, *lotus hispidus*, suckling clover.

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grass is the amount of nitrogen available. Clovers, on the other hand, are most likely to be affected by deficiencies of lime, phosphates, or potash. This means that where the better clovers grow well, the good grasses should also grow well in association with the clovers.

It is interesting to observe that the standard of fertility of farm land can frequently be very accurately assessed by an examination of the sward components, and such a knowledge often provides a valuable guide for top-dressing, compounding a seeds mixture, or even for cropping. It should be noted that although the existing standard of fertility may be too low for ryegrass, this does not imply that ryegrass should not be sown, as it may well be possible to raise the fertility by a judicious application of fertiliser, and by encouraging clover growth.

Where surface sowing is contemplated, however, it is folly to sow ryegrass on obviously poor land until the fertility has first been raised by increasing the clover-content of the sward. It is particularly worthy of note that ryegrass and white clover show somewhat similar demands, and where white clover grows well, it may be safely assumed that ryegrass also will grow well in association with the clover.

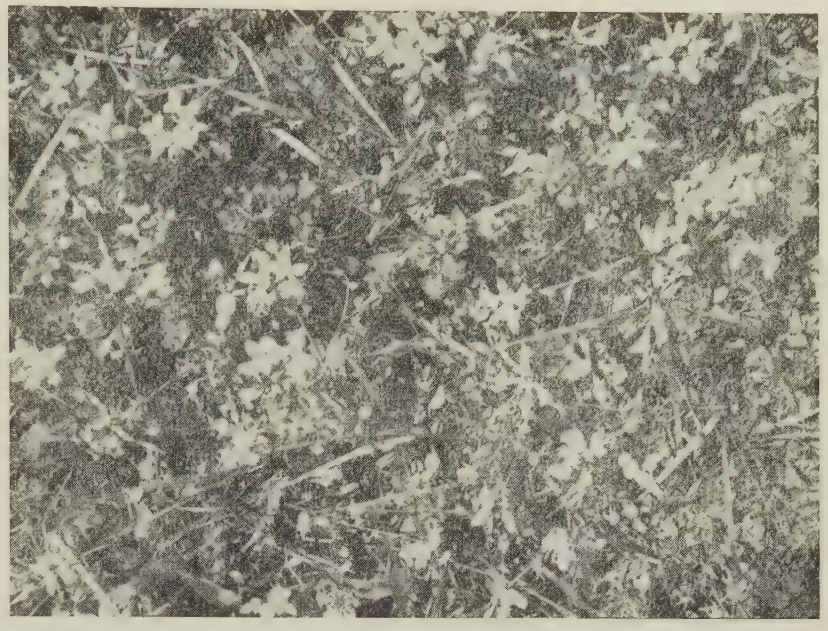

Fig. 3.—Browntop and *lotus major*. The seeds mixture sown contained perennial ryegrass and white clover, but because of the low fertility, these failed to establish and were replaced by *lotus major* and browntop. This picture, which was taken on a "no manure" plot, reflects very accurately the existing standard of fertility.

Moisture-content Of the Soil

Pasture plants display a wide range in their respective demands for moisture and in their toleration of very wet or very dry conditions. This fact very frequently explains the failure of certain species which have been sown in a mixture and the rise to dominance of another species, even though only a small quantity of this was included, and for this reason it is well to know something of the respective moisture tolerations or requirements of the various species commonly sown.

These may be rated in approximately the following order, the species that will stand excessive moisture being placed first:—Paspalum, *lotus major*, Yorkshire fog, meadow foxtail, timothy, alsike, browntop, sweet vernal, Italian ryegrass, perennial ryegrass, white clover, crested dogstail, cocksfoot, red clover, strawberry clover, subterranean clover, *lotus hispidus*, Chewings fescue, danthonia, suckling clover.

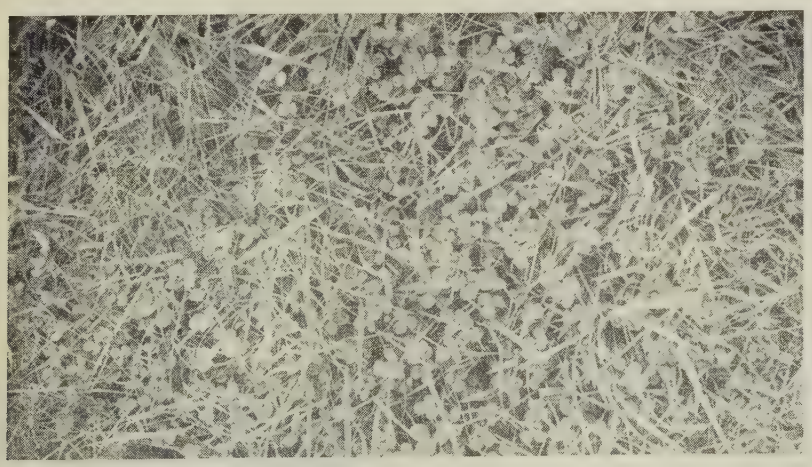

Fig. 4.—This photograph was taken on a plot adjoining Fig. 3. The seeds mixture and cultivation, etc., were the same as in Fig. 3, but fertiliser was apllied. Note that the application of fertiliser has resulted in an entirely different sward consisting of perennial ryegrass and white clover. This again provides a valuable index to the existing fertility.

Pasture Association

It is common experience that many of the grasses and clovers listed may co-exist as a pasture association. Where moisture conditions are favourable to ryegrass—about average—meadow foxtail, timothy, cocksfoot, etc., may also be well represented. Certain species, such as paspalum and Yorkshire fog, are highly adaptable, and their habitat may range from fairly moist to comparatively dry ground. From the point of view of clover establishment it should be noted that *lotus major* will succeed on land which might be described as definitely wet, and on which white clover would almost certainly prove a failure.

On dry slopes which are exposed to sun and wind it is sometimes difficult to establish and to hold white clover. Subterranean clover, on the other hand, offers good prospects of success under these conditions, and, as it makes much

lower demands on soil fertility than white clover once it is established, it is easier to maintain. Where the conditions are too dry and the soil too poor for subterranean clover, *lotus hispidus* may still succeed, and will greatly improve the production of its associate grasses, such as danthonia, Chewings fescue, etc.

Effect of Climate

The more common pasture plants are capable of growing reasonably well on most of the farming land throughout the temperature range between North Auckland and Southland. The chief important exception to this rule is paspalum, which succeeds best in the warm northern districts. Ratstail also prefers the warmer districts, but this grass is of little importance on good land, where it is generally regarded as a weed.

Management Factor

It is sometimes contended that within certain limits the proportions of the various components of a seeds mixture do not greatly matter, and that the composition of the resulting sward depends very largely on management. According as the type of management combines with the nutritional plane of the soil, its moisture-content, and the climate, to favour or to oppose the growth of any particular species, so will that species tend to be proportionally represented in the sward.

That there is much to be said for this argument no-one will deny, and in actual farm practice this generally means that management plays the deciding role, so that in the long run the farmer ultimately gets very much the type of pasture which he deserves. For this reason the system of management should be kept very closely in mind when deciding the different species which should be included in a seeds mixture. The importance of the fertility and the moisture factors has already been mentioned, and although these are to some extent natural, they can be greatly influenced by topdressing and by drainage.

Light and Shade

Another important aspect of management is its influence in controlling light and shade. The white clover in a sward is readily suppressed by a too rank growth of cocksfoot or ryegrass. A balance can, however, readily be maintained by controlled grazing, particularly during the winter months. Similarly, the adverse smothering effect of too much red clover in a mixture should not be overlooked. Repeated crops of hay from the same field may also exercise a detrimental effect and unduly favour the establishment of annual grasses and weeds at the expense of the perennial species.

Associated with the specialised management which certain of the pasture components may require in order that they may maintain their position in the sward is their importance in providing their maximum growth at different seasons of the year. For this reason it may be advisable to include in the mixture an assortment of species which will give the pasture a longer grazing season.

Although it is admitted that in some respects the management factor renders this difficult in practice, it is sometimes possible to choose natural associations having somewhat similar basic requirements and the components of which tend to be complementary with each other rather than competing for dominance.

Mutual Benefit

Paspalum and subterranean clover can frequently provide a valuable association which is to their mutual benefit. By itself, either plant has a limited growing season, but as their maximum growth is produced at different times, they do not compete, and greatly extend the producing season of the pasture. In addition, the vigour and yield of the paspalum is greatly improved by the nitrogen provided by the clover. Similarly, other species, such as ryegrass, cocksfoot, dogstail, white and red clovers, etc., may also be included in such an association provided that conditions, in general, supply their essential requirements and that they do not tend to suppress other valuable species through being unduly favoured.

Because of its value as an early producer of palatable spring feed, prairie grass is sometimes included in a mixture. This grass, however, does not succeed well in a mixed pasture, although good results have been claimed for pure sowings under specialised management.

Generally speaking, the spring and autumn periods will be well catered for by any sward which contains a good proportion of ryegrass, dogstail, and subterranean or white clover, along with the sprinkling of volunteers which will usually appear in a pasture. Some difficulty is frequently experienced, however, in maintaining the summer growth, and it is worthy of note that timothy, cocksfoot, browntop, alsike, red clover, and *lotus major*, which produce at their maximum during the late spring and summer, can sometimes be usefully employed to bridge the gap between the periods of spring and autumn plenty. In the northern districts, where the climatic conditions favour its growth, paspalum fills this gap to perfection.

(To be continued.)

In three instances in the Nelson Central district blue lupin plants were very definitely damaged at the germination stage by superphosphate being sown in conjunction with the lupin seed. Where the manure was applied a few days prior to sowing the seed, no evidence of damage occurred.

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Baconless Breakfasts in England

It Rests with the New Zealand Farmer Whether the Homeland Has Bacon or "Macon"

M. McG. COOPER, Secretary of the National Council of Primary Production, Wellington

THE conservative nature of the Briton is nowhere better evidenced than at the breakfast table. Scotland, with an influence out of proportion to her size, has dictated that the first course shall be good oatmeal porridge, although of recent years there has been a liberal class of devotees of patent American cereal foods. There is, as well, a small group of leftists—absolute extremists—whose tortured bodies demand the purgative salve of stewed prunes or other fruit.

So much for the foundations. They are eminently sound, and display a certain degree of latitude according to individual taste, but the main structure, the second course, is rock-like in its steadfastness. John Bull, for at least five days of the week, insists on bacon and egg. One day may be assigned to sausages, perhaps another to kippers, but he eats such things merely to deepen his appreciation of the hen and the pig.

The Substitute

And now bacon is being rationed. The prop and support of the starting day has been withdrawn, and John Bull marches on a stomach, either military or civil, which has been denied its first essential. The Rock of Gibraltar is cracking, and they are trying to patch up the crevices with a substitute material, called "macon," obtained by curing mutton. It is like putting lime in a super bag and calling it phosphate.

Why is Britain being subject to a ration card for bacon? The reasons, briefly told, are that in a normal year she consumes more than half a million tons of bacon and ham, some of which is home or Empire produced, but the great bulk of which is from Continental Europe. Denmark, Sweden, Poland, and the Netherlands were the prime

What are the people in Great Britain to eat for breakfast? Bacon, the staple breakfast food of the Englishman, is being rationed at Home, and a duty rests on every dairy farmer in New Zealand to contribute towards making good the deficiencies in supply.

sources of that appetising smell from the family frying pan.

Poland is now completely out of the picture, while the remaining three countries, which are contiguous to Germany by land or by sea, are subject to increasing demands from enemy trade. Added to this, there are the hazards of transport by sea. Scarcely a day passes without some Swedish, Dutch, or Danish ship being mined or torpedoed in the North Sea. These are the ships which are bringing butter and bacon to England.

It appears that there will be a repetition of the experience during the last war, when Continental supplies of bacon, and butter as well, fell to a very small figure. The United States of America and Canada filled the breach very nobly; in fact, the total imports of bacon were maintained at higher than pre-war levels. But what about this war? Canada will certainly do her part, because her pig industry is on an expanding basis, but it is highly improbable that the United States will be allowed to expand her exports, because dollar exchange will be much too precious for buying aeroplanes and the fuel to run them. The effort must come from the Empire, and there is no question but that New Zealand is in a position to contribute very effectively to making good the deficiencies in supply.

New Zealand's Part

It is not a vain statement to say that New Zealand could double the amount of her pig production on the food supplies that are available, particularly now that Australian barley and pollard are obtainable at the most favourable prices since 1910.

The limiting factor to increased pig production is not one of food; it is the will to farm pigs properly. The average New Zealand dairy farmer has no great love for pigs, and he expresses his attitude by careless and slovenly management. It is a curious anomaly that this should be so in a body of farmers who in most other respects lead the world in initiative and efficiency of enterprise.

How can the farmer increase his pig production? In the first place, he wants reasonably efficient housing and accommodation, and there are men qualified to advise him of this—the Supervisors of the Pig Councils. Apart from any direct material advantage to production of adequate housing, there is the psychological influence on the farmer himself who is given the opportunity to take in his pigs a pride which was denied him when they farrowed three or four miserable runts under the shelter of a blackberry bush. Good housing brings in its train lower mortality, more efficient utilisation of food, and, above all, better management, for the farmer has courage to look his pigs in the eye and see what they are doing for him.

Feeding

When it comes to feeding, it is advisable not to regard pigs as convenient drainpipes for troublesome dairy by-products. It is a good thing, too, to remember that a pig's digestive system is more like a human being's than any

other domesticated animal, and so his reactions will be very much akin to your own.

Even on separated milk it is possible to produce 36 lb. of pig-meat for every 100 lb. of butterfat produced. If your cows are doing 300 lb. of fat, then you can produce a light baconer for every cow milked. Unfortunately, however, milk is highly seasonal in its supply, and so it is necessary to feed roots, meat-meal, and grain to balance up feed supplies. Nevertheless, such extra food, used intelligently, should represent extra pig-meat, and it is not inopportune to remind you that the farmers who are making the most out of their pigs are feeding home-grown roots and supplementing roots and milk with limited amounts of meat-meal and grain.

Aim of Every Dairy Farmer

Let this be the aim of every dairy farmer on a home separation farm—**produce a baconer for every cow you milk.** On a cheese-milk farm a baconer to every two cows is the standard. Do this, and you will double the pig production in New Zealand. True, it will increase the demands on your already over-burdened time, but it will also increase your net returns. Further than this, you will be making a real contribution to the Empire's war effort, because you will be answering the appeal of every man, woman, and child in Great Britain for more Empire-produced food.

Think of John Bull and Field-Marshal Goering as the two stout persons they are. As the war proceeds we hope that Goering's uniforms will hang progressively slacker on his rotund body, but it is up to us to make certain that John Bull's waistcoast fits snugly.

The question is whether there shall be bacon or "macon" on the British breakfast table. That question can be answered in the pig pens of every New Zealand dairy farm.

Cheap Barley and Pollard

Importations from Australia Available To Farmers for Pig Feed

R. B. TENNENT, Director of Primary Production.

ON the recommendation of the National Council of Primary Production the Government has made arrangements for the importation of Australian barley and pollard into the North Island to assist dairy farmers in increasing their output of pigs of bacon weight.

The Imperial Government's request that 75 per cent. of pigs exported should be more than 100lb. weight has upset the balance in pig feeding obtained by marketing pigs either at pork or bacon weights according to the sufficiency of milk supplies. If no steps had been taken to secure additional feeding stuffs a decline in pig production would have been inevitable, and, for reasons well known to all farmers, an increase in pig production is imperative.

Accordingly an appeal was made to farmers to increase the acreage of crops for their pigs and judging by the increased crops in most of the dairying districts, there has been a very good response to this appeal.

As most dairyfarms have, of necessity, been limited to the growing of root crops which, by themselves or in combination with small amounts of meat-meal or milk, do not constitute a fattening ration, it was necessary to obtain additional supplies of such hard feed as barley and pollard.

The Wheat Controller has arranged importations of Australian pollard, which is now available to North Island farmers at prices ranging from £6 14s 5d to £6 19s 4d per ton according to port of entry. These prices refer to cash sales of minimum lots of 1 ton on trucks at the main ports. In some instances they involve a slight loss to the Wheat Controller, and in others a slight profit. On the balance, a small profit will be made, and this will be set aside as a stabilisation fund to compensate any rise in the initial purchase price in Australia.

Barley is being imported by the Internal Marketing Department, and the price for minimum lots of 10 bags for cash sales is 3s 4d per bushel ex wharf. Railage and other transport costs are additional. This price, as in the case of the quotations for pollard, includes the commission for merchants, through whom orders are placed in the ordinary way.

It is to be stressed that the substantial economies made possible for users of barley and pollard can be obtained only by placing orders for delivery ex ship and in the minimum quantities stated previously. The moment barley or pollard goes into store, additional costs are incurred. In the same way, sales of small lots, for obvious reasons, cannot be made at the favourable figures quoted for the larger quantities. Place your orders with your merchants in the usual way, and buy for ex ship delivery of at least the minimum quantities.

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TO-DAY

Production of Pig-meat

How To Utilise Supplies of Cheap Barley To Best Advantage

M. J. SCOTT, Superintendent of the Pig Industry, Wellington

BEGINNING with the New Year, a progressive falling off in dairy by-products for pig feed always takes piace, and is usually met in the easy way by sending pigs away for slaughter whatever their weight. Considerable modification of this procedure is now necessary, and discretion is required on the part of farmers lest the pork quota be supplied too early in the season.

All would be well advised both from a cash and a national viewpoint to keep porkers as long as possible and bring them up to bacon weight, that is, 100 lb. carcass or heavier. This can be done by using meals. Both pollard and barley are recognised as the most consistent and satisfactory meals for pig feed. With milk or whey either meal makes an ideal combination for pigs of all ages.

The procedure by which the pig farmer can best utilise the cheap barley now available for fattening his stock is discussed in this article. It is now a matter of national urgency to use as much meal as possible while there is still milk available and while the weather is warm enough to fatten pigs regularly.

Matter of Urgency

In the past it was a matter of choice as to how much meal should be used with the dairy by-products; now it is a matter of national urgency to use as much meal as possible while there is still milk available and while the weather is warm enough to fatten pigs readily.

It has been shown repeatedly that 5 lb. of feed can produce 1 lb. of pig-meat, and, as pollard and barley when used with milk or whey give better returns than this, it can be safely assumed that every 100 lb. of meal used with milk will yield at least 25 lb. of pig-meat. While this kind of return may not tempt the average skim-milk

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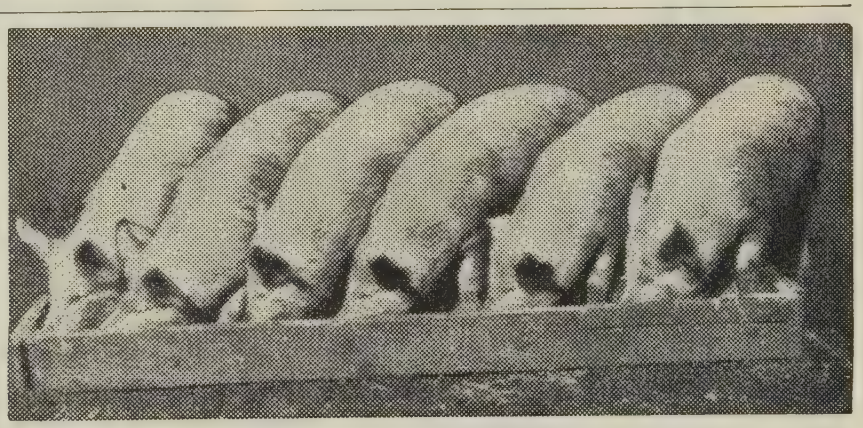
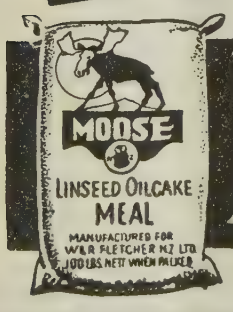


★ Barley and other cereals are low in protein and therefore require balancing with *high Protein foods such as Moose Meal.* The conditioning and healthful properties of *Moose* oil-meal saves deaths and saves pounds.



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feeder in ordinary circumstances, it certainly shows a substantial profit on meals used, and it does ensure that the extra pig-meat required will be forthcoming, and that no surplus of underfed pigs will be thrown on the market or will have to be carried through the winter.

Use More Meals

For years past farmers have been advised to use more meals. While their caution in rejecting the advice is to be admired, the need for changing their viewpoint now is equally stressed. Use barley, pollard, and meals generously while milk and whey are still available, and so avoid trying to do the impossible, that is, to fatten pigs in winter.

At the present prices of pig-meats and meals it would be profitable to use 3 lb. to 4 lb. of meal with one or two gallons of milk daily for pigs which are being finished off. When fed at this rate, it is essential that the barley is either ground, crushed, or soaked. Careful tests have shown that ground barley is 10 to 15 per cent. better than whole dry grain. Fifteen per cent. of 3s 4d is about 6d, and unless barley can be crushed for this or less it would pay to use it whole. If soaked in cold water for two to three days whole barley is just as good as ground barley. Where steam or hot water is available, these reduce the time required for soaking.

Penalties of Neglect

In addition to using more meal for finishing pigs on to bacon weights, meal could be used with advantage for bringing pigs through the weaner stage up to 70 lb. weight.

Neglect of weaned pigs is one of the worst abuses of pig raising in New Zealand, and carries with it the penalties of unthriftiness, disease incidence, and rejections at the works. Most of these could be avoided by feeding pigs better until they have passed the baby stage, that is, about 3½ months old. Meals fed to pigs between the ages of three weeks and three months are more profitably used than at any other stage of the pig's life.

Well weaned is half-grown.

Peas as Pig Feed

R.H. (HOKIANGA):—

I am sowing field peas for this winter's pig feed. Must I ripen and thresh them, or would pigs eat them as hay if cut when in blossom?

SUPERINTENDENT OF PIG INDUSTRY:—

Field peas should be ripened. As hay cut in blossom they are no better than other kinds of hay (namely, grass, clover, lucerne) as a pig feed. It is not necessary to thresh them. Fed in the straw, they serve as bedding, and are as good as when fed as meal.

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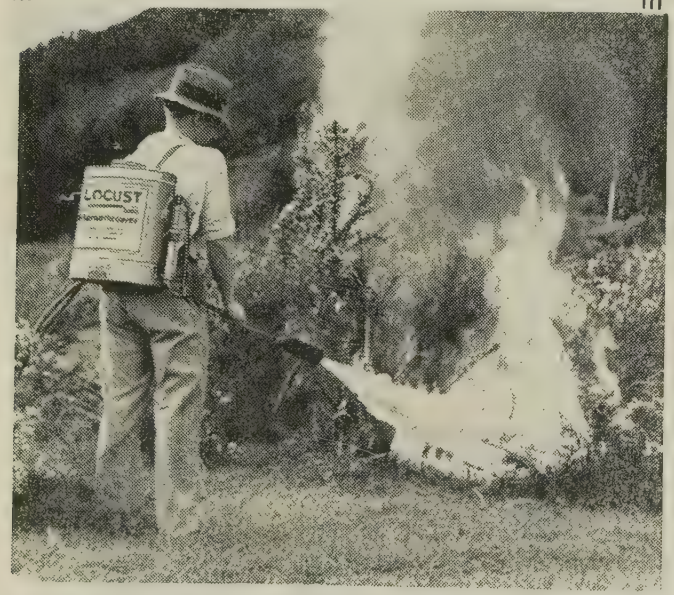

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Blue Lupins As A Sheep Feed

Mid-Canterbury Farmer Proves Their Value

— By —
G. K. McPHERSON,
Instructor in Agriculture, Ashburton.

Two stages in the feeding-off of the blue lupin crop. This crop may be fed-off in breaks in the same way as turnips or rape.

ALTHOUGH the A. and P. statistics for the 1938-39 season do not reveal the area devoted to the blue lupin crop in the Ashburton County, the statistics do indicate that, excluding cereal crops, rape, and chou moellier, there were almost 600 acres of green feed grown and classed as "other green fodder." It would probably be correct to assume that the greater portion of this area was sown in blue lupins.

In addition to lupin-dominant crops, many farmers in recent years have sown a sprinkling of blue lupins in conjunction with turnips, oats, and Italian ryegrass. At all events, this crop has now attained a fair measure of popularity. Originally confined principally to the medium soils in the Chertsey, Pendarves, Mitcham districts, it has now spread to better quality land in such localities as Greenstreet, Winchmore, and Methven, and this last season some crops were observed on the light land of the Hinds-Ealing plains.

Three Kinds

There are three kinds of lupins, blue, yellow, and white, but the blue lupin, *Lupinus augustifolium*, is the only one which is grown in the Ashburton County, probably because it is the least susceptible to frost injury. In this county, however, frosts will injure the blue lupins when the plants are in the seedling stage, and also when the crop has reached, or is approaching, the flowering stage.

The experiences of an Ashburton farmer show that on the light to medium land of Canterbury blue lupins are an excellent crop both as a sheep feed and a soil builder. With this crop he has increased his sheep-carrying capacity, and has also raised considerably the yield per acre of wheat. His system of growing and utilising the crop are fully described, although modifications may be necessary in other districts.

Many of the original growers of blue lupins expressed disappointment with the results obtained, and consequently the crop lost favour for a time. It was claimed that the crop was liable to frost injury, that sheep did not take kindly to the herbage, and that the plant possessed an alkaloid which was liable to cause death or to produce a trembling or staggering gait, particularly among breeding ewes. It was also claimed that it was a difficult crop to harvest.

There would appear to be a certain measure of truth in these statements, but the experiences of farmers who have persevered with the crop suggest that, with a proper knowledge of its characteristics, any limitations possessed by the plant can be largely eliminated.

The past season saw many failures with the turnip crop in Canterbury, and for this season it is possible that during the coming season some farmers will turn towards the blue lupin crop as a means of augmenting their supply of winter sheep feed. In this connection, farmers will be interested in the experiences of Mr. W. H. Wilkinson, of Chertsey, the pioneer of the blue lupin crop in the Ashburton County.

Mr. Wilkinson is farming a property of light to medium land three or four miles west of Chertsey, and some indication of the fertility of his soil can be gauged from the fact that the wheat yield in a normal season varies between 20 and 25 bushels per acre. Mr. Wilkinson was not only the first farmer to grow blue lupins in the

Ashburton County, but he is also one of the few who have persevered with the crop and made a success of it.

First Trial

Years ago it occurred to Mr. Wilkinson that the failure of pastures to establish and hold on the light land of Canterbury was possibly due to a deficiency of nitrogen in the soil, which to some extent could be rectified by growing a legume, and as far back as 1925 he purchased two bushels of blue lupin seed. The area sown was harvested, and 40 to 50 bushels of seed were obtained.

Mr. Wilkinson's sole intention at this time was to augment his supply of seed so that he could sow areas each year and gradually build up the fertility of the soil by ploughing under the green material when the crop had attained sufficient height. On the original area sown, however, it was found that a line of hoggets put on to clean up the weed growth ate the young plants from the re-seeding also. The hoggets came through the winter in very good condition, and had an excellent bloom.

This trial demonstrated that blue lupins had possibilities as a forage crop as well as a builder of soil fertility, and from that time onwards Mr. Wilkinson experimented with the crop to determine the best methods to follow to combine these two desirable features to the best advantage. The methods described are those which he ultimately found to be the most suitable for his particular soil and climatic conditions.

Turnips and blue lupins—a common mixture on some Mid-Canterbury farms.

It may be mentioned, however, that it was not until the advent of the tractor, which permitted rapid cultivation, that their possibilities as a crop for the light and medium land could be fully exploited.

Time of Sowing

Time of sowing is a most important factor in the successful growing of the lupin crop. This should be regulated

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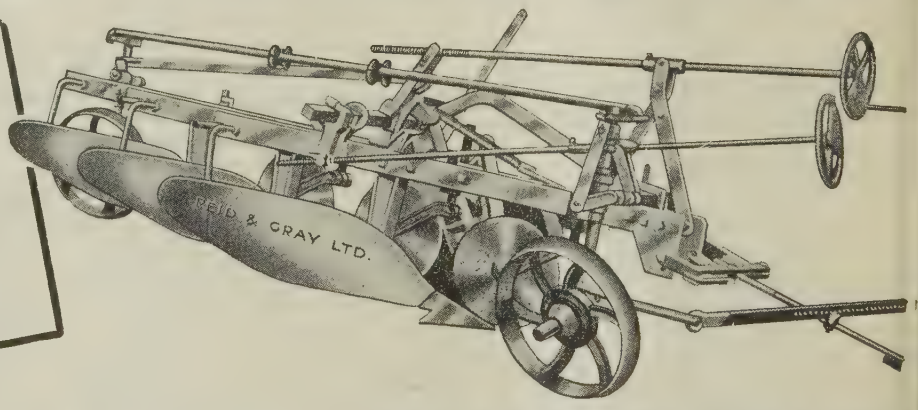

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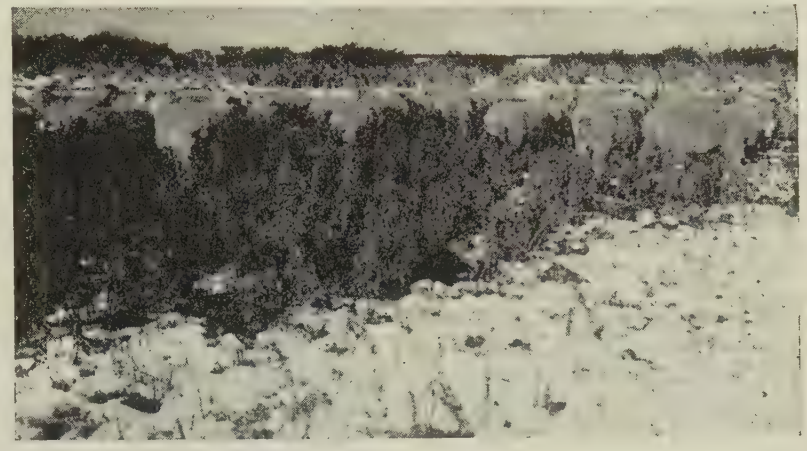
to avoid frost injury and to correspond with the period when the feed is required. Mr. Wilkinson arranges his sowings to provide autumn feed (April, May, June) and spring and early summer feed (September to December inclusive). For July feeding, and until the ewes lamb in August, turnips are fed.

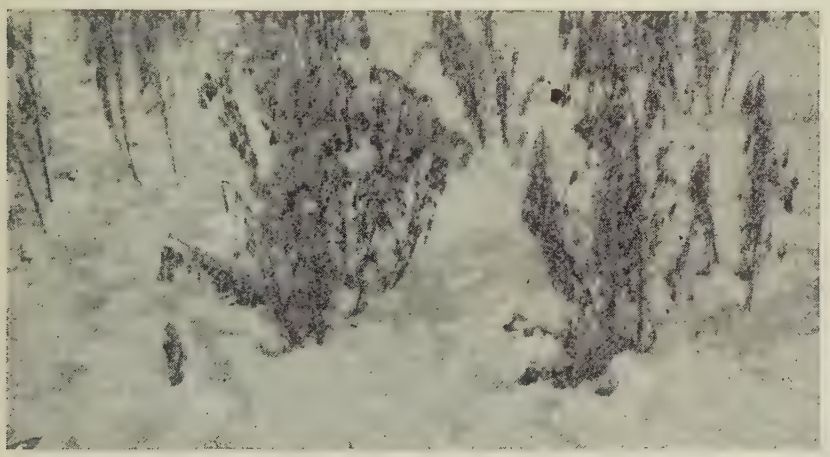
Sowing for Autumn Feed

For autumn feed, lupins are preferably sown in fallowed ground out of grass. A long fallow is not necessary, but sufficient moisture must be conserved to offset any dry period which may intervene. Sowings may take place at intervals from mid-December until the third week in January.

Seeding for this sowing should be at the rate of two or three bushels per acre, preferably the heavier seeding.



During falls of snow lupins provide a useful supply of green feed.



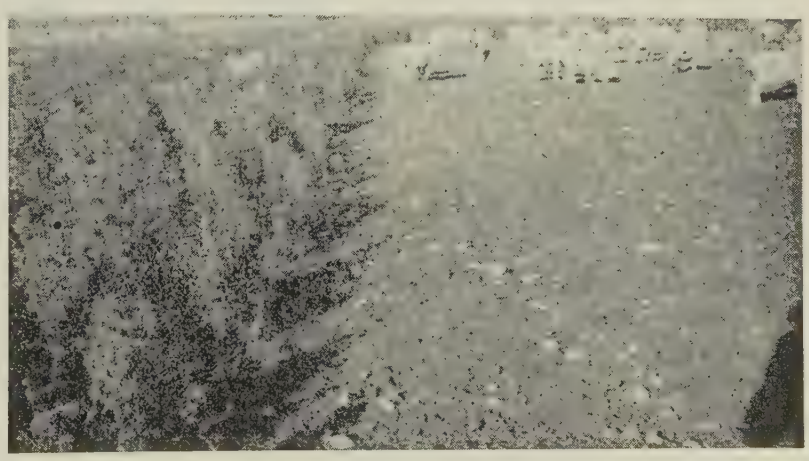
Lupins in the flowering stage will not resist frost. Taken in mid-July, this photograph shows lupins which were sown with turnips in December.

No fertilisers are necessary if the land is in reasonably good heart. The seed should be drilled very lightly—1 inch—and the land should not be rolled either before or after sowing. Lupins sown at this time will provide feed from mid-April until the end of June, the great advantage being that during this period the grass paddocks are being spelled.

Some indication of the carrying capacity of lupins for autumn feed may be gauged from the following examples. In one instance 50 acres with bare, run-out paddock carried 850 breeding ewes for 2½ months; in another case 70 acres of lupins carried 950 breeding ewes for seven to eight weeks. In still another instance a 50-acre paddock carried 1100 ewes for six weeks and 1300 ewes for an additional two weeks. When this feeding-off is completed the soil is usually very friable and is in excellent order for one-furrow wheat.

Sowing for Spring Feed

For spring feed, lupins are sown after wheat in March or April, preferably the former month. It is not considered advisable that lupins should follow a legume. Frosts will retard the growth of the plants when they are in the seedling stage, and therefore sowings later than April are not recommended. Perennial ryegrass, Italian ryegrass, or oats are included with the lupins. the grass or oats being sown at ½ to ¾ bushels per acre, and the lupins at 1 to 1½ bushels per acre. To facilitate the strike of grass the land should be rolled in this instance.



Lupins provide a good stand-by crop in a dry year, when turnips may be a failure

Given reasonable weather conditions, the crop is ready for feeding-off in late August or early September, and ewes as they lamb are shifted on to the lupins and grass. This sowing may be grazed until the ripening stage, but as the pods ripen care must be exercised, as there is a danger of sheep losses. Provided a good run-off paddock is made available, however, the sheep automatically balance their own diet, and any danger is largely eliminated.

As the crop approaches the ripening stage, feeding-off is regulated in order to allow sufficient seed—two to three bushels per acre or more—to shell out for next season. Immediately the bulk of the seeds have shelled out the area is grubbed once or twice with a stiff tine grubber, and if it is desired to obtain a good strike this operation naturally must be carried out before rain is experienced. The resultant crop is equivalent to a December or January sowing, so that a good supply of autumn feed is provided at very little cost.

The grubbing to cover the lupin seed will injure the sward of grass, but not to the extent one would expect. It is the crop obtained from the re-seeding which confers the greatest benefit on the soil.

Lupins and Turnips

In Mid-Canterbury it has been a common practice during the past few years for farmers to sow about ½ to ¾ bushels of lupins per acre with the turnip crop. This practice is to be recommended. Not only are the sheep provided with a variety of food, but it is also a good method of acclimatising the sheep to the taste of the lupins. Mr. Wilkinson considers that cross-drilling the lupin seed in the turnip crop in February or March would probably be an advantage, as there would be less chance of frost damage.

Seed Production

For seed production, lupins are best sown about the middle of March at the rate of 1½ to 2 bushels per acre. If sown at this time the crop is ready to harvest some time in December, when harvesting machinery is easy to procure and weather conditions are most suitable for maturing the seed. In addition, seed harvested at this time is available for sowing the following autumn.

If spring-sown, the crop will not be ready for harvesting until late in the autumn, when there is less heat in the sun and consequently greater difficulty in curing the seed. Moreover, seed harvested at this time may be too late for autumn sowing.

Ewes and lambs grazing on lupins and grass in the spring.

Harvesting the Crop

The blue lupin is a very tricky crop to harvest, and even under the best of conditions only 75 per cent. of the seed is obtained. If harvested a little on the green side, the seed may be difficult to mature, whereas, if left a little late, the pods may crack open. Probably the safest and the best method is to reap the crop with the binder, stack, and allow the seed to mature in the stack before threshing. While producing a good sample, this method is fairly expensive, and can only be adopted with a crop which is reasonably high.

Windrowing of crops is a common practice, but has the disadvantage that the seed is inclined to drop out in rows, making the resulting crop from the re-seeding rather uneven. In addition, if the crop is rather heavy the top layer of the windrow is inclined to become over-mature while the bottom layer is still quite green. With direct heading there may be a greater risk of the seed shelling, but the method has the advantage that the seed shells form an even spread over the whole paddock. If the crop is windrowed or direct-headed the seed should be allowed to mature in the paddock in manure sacks, or, if in grain sacks, they should be only partly filled with seed.

Feeding the Lupins

Lupins are bitter to the taste, and consequently sheep do not take kindly to them for a start. Once a taste for them is acquired, however, they graze the crop readily. Sheep not accustomed to lupins should be worked on to them gradually—put on in the daytime and removed to a rather bare paddock at night. A liking for them is thus acquired in the course of a few days. Ewes foreign to lupins should not be put on the crop at or near tupping time. With autumn feeding, sheep should have access to the lupins in the daytime and be removed each night to grass, whereas, with spring feeding, the ewes and lambs may be left on the crop continuously if frosts are not being experienced.

Lupins cannot be classed as a fattening crop in the same way as turnips or rape, although sheep grazing on them will actually improve in condition and maintain a good, healthy appearance. Mr. Wilkinson considers that lupins up to 2 feet in height are unsurpassed for carrying hoggets through the autumn. It has also been Mr. Wilkinson's experience that lupins act as a tonic—

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that they cure scouring and generally improve the health of the sheep. If reasonable care is taken deaths are no more frequent than with any other crop.

Avoiding Frost Injury

It is quite possible that crops sown in December may begin flowering towards the end of June, at a time when heavy frosts are experienced. If the crop has not been completely fed-off by this time it may be advisable to mow the remaining portion. The mown material will not frost, and by this means a week or ten days' extra feeding can be obtained.

Summary

Mr. Wilkinson has been growing blue lupins for many years now, and has shown that on the light to medium land of Canterbury they are an excellent crop both as a sheep feed and a soil builder. This crop has not only enabled him to increase his sheep-carrying capacity, but it has also been the means of raising considerably the yield per acre of wheat. That lupins improve the physical condition of the soil, rendering it more friable and thereby reducing cultivation costs for the succeeding crop, has been amply demonstrated. In addition, it has been found that twitch is more easily eradicated after a crop of lupins has been taken off the land.

Summarised, the main features of Mr. Wilkinson's system of growing and utilising the crop are as follows:—

(1) Provision of spring feed (September to December inclusive) by sowing lupins and grass after a cereal in March or April, preferably March.

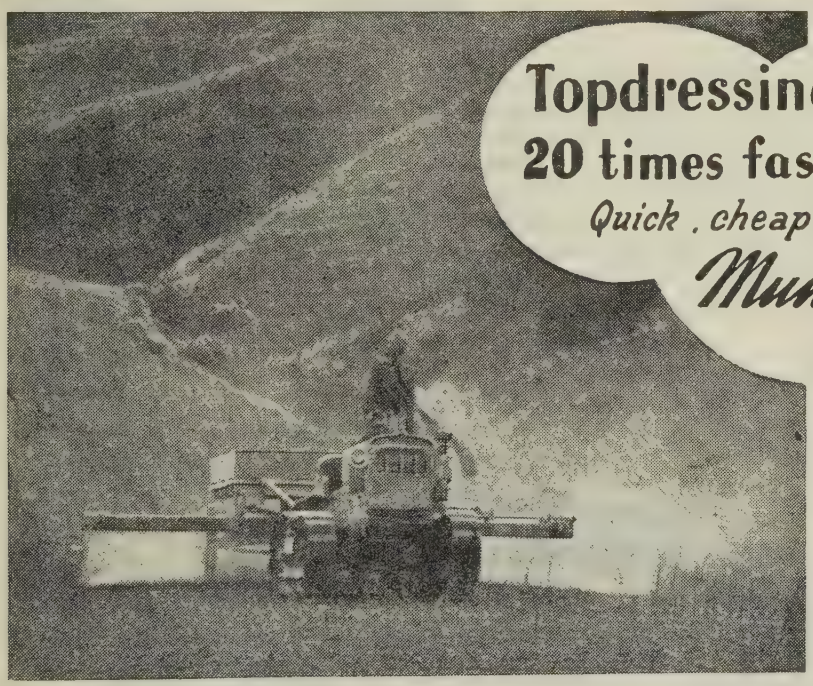
(2) Provision of autumn feed (April, May, June) by sowing lupins in December or January, or by allowing sufficient plants from a March sowing to re-seed and produce a second crop.

(3) For seed production, lupins are sown in March by themselves and harvested in December, the re-seeding producing a crop for autumn feed.

(4) Lupin crops are not ploughed under for green manure, the soil fertility being built up through the rooting system of the lupins and the grazing of the sheep.

(5) Wheat usually follows the lupin crop.

It should be particularly noted, however, that the methods practised by Mr. Wilkinson may not be entirely applicable to other parts of Canterbury, or even Mid-Canterbury. Mr. Wilkinson has gradually evolved a system of grazing and utilisation of the crop to suit his own particular type of soil, climate, and system of farming. Where these differ, modifications of his system would no doubt be necessary to obtain satisfactory results.



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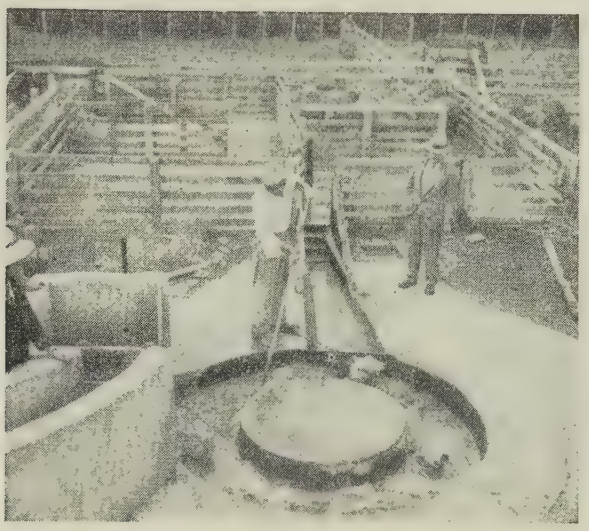
Careless Dipping Is A Waste Of Money

Uses of Various Types of Dips

— By —
J. E. DUNCAN,
Wool Instructor, Livestock Division,
Wellington.



IN a short article of this nature it is not intended to deal at any length with the history of dipping, but the illustrations reproduced will no doubt be of interest in view of the great contrast they represent compared with modern methods. Apparently the art of "salving" can be traced right back to the earliest days of shepherding, and is recorded in Britain as far back as A.D. 1280.

In those early days tar was rubbed into the fleece as a remedy for scab, but during the nineteenth century flockmasters began to compound it with other substances, such as grease and rancid butter, in an endeavour to overcome the inevitable staining of the wool which took place. Salving was undoubtedly a slow and back-breaking job, and the early methods of dipping (Fig. 2) which began to replace it at the beginning of the nineteenth century were little better.

It was really colonisation which ushered in the process of dipping as we know it today, for necessity again proved to be the mother of invention when the early pastoralists were faced with the necessity of treating their ever-increasing flocks in an expeditious manner—and so were evolved the swim dips and draining pens and other equipment with which every sheep farmer is now all too familiar.

This is the first of a series of three articles on dips and dipping. The second one will deal with the actual operation of dipping, and the third with the choice and construction of suitable plant. They will later be published together in bulletin form, including plans and diagrams of the various types of dips.

Does Dipping Pay?

In New Zealand the sheep farmer is not left to decide whether dipping is necessary or desirable, as he is required to dip by law. For this reason a small minority of the farming community still regard the annual dipping as a necessary evil and something to be got over as quickly and with as little trouble as possible.

There is more than a grain of truth in this view, provided the emphasis is placed on the word "necessary," and provided the speed with which the job is disposed of does not interfere with its efficiency. There is no doubt that poor workmanship in dipping sheep is a bad investment, because if it is done in a slipshod manner the money spent on materials and labour is largely wasted, as the sheep receive no lasting benefit.

The conditions which go to make for successful dipping will be fully discussed in a subsequent article, but it will not be out of place here to mention the damage done by parasites in the fleece and something about the particular parasites which cause it.

In New Zealand we are fortunate in not having to cope with scab, which has proved such a scourge in some of the other sheep-raising countries. In 1881 it was estimated that there were 700,000 sheep suffering from this trouble in New Zealand, but by 1893 scab was finally eliminated by a rigorously enforced policy of control, which included shooting some of the affected sheep where they were located in inaccesible areas. Today we have only lice and keds to cope with, although they can be quite bad enough.

Damage by Parasites

Although cases of sheep actually dying from the attacks of these parasites must be very rare indeed, the amount of damage which they cause is nevertheless great, and may be summed up as follows:—

(1) Bad infestation with keds (ticks) causes permanent staining of the fleece (due to their excreta) and consequent loss in value of wool.
(2) Instead of devoting their whole time to growing wool and mutton, parasite-infested sheep devote much of their time to rubbing,

scratching, and biting themselves so that they thrive badly and damage their fleeces. (See Fig. 3). Lice cause an intolerable amount of irritation, and although it is a moot point whether they actually bite through the wool fibres, they cause much indirect loss and spoilage of the fleece, due to the sheep rubbing against fence posts, etc. Keds, although they do not appear to cause the sheep the same amount of irritation, suck quite appreciable quantities of blood if present in large numbers.

(3) An indirect source of loss is that sheep weakened by the ravages of parasites fall a prey to other diseases which normally they could resist; nor can ewes which are thriving badly be expected to produce robust lambs.

(4) Although it is a punishable offence to offer lousy sheep for sale in a public yard, there are nevertheless cases where this happens and clean sheep become infested, with consequent loss to their owners.

(5) As dipping does not improve the fleeces of clean sheep, the total cost of the operation must be debited to lice and keds. No accurate cost of dipping our flocks each year is available, but the cost of dipping materials alone approaches £150,000 per annum, and when the cost of providing labour, plant, etc., is all taken into account the total cost must be very much higher. It is equally impossible to estimate the cost of the damage done by the parasites or what it would amount to if they were left uncontrolled, but one thing is self-evident—that careless dipping is sheer waste of money.

Parasites Concerned

The parasties which give us trouble in New Zealand are several species of lice and the sheep ked, frequently and erroneously referred to as the sheep "tick."

The most common species of lice familiar to most sheep farmers is commonly called the red-headed sheep louse (scientific name, *Trichodectes sphaerocephalus* or *T. ovis*), and is a very small wingless insect (about one millimetre or one twenty-fifth of an inch in length) which, because of its pale colour, is not always easy to see among the wool.

It is ilustrated in Fig. 4, and receives its common name because of the head and thorax being a rusty reddish colour. Its mouth-parts are designed for feeding on scales and other debris on the surface of the skin, and at no time does it suck blood.

It is very active in its habits, and has great tenacity of life, which, coupled with its ability to breed very rapidly, enables it to infest a clean flock in a very short time, for although it never leaves its host at any other time, it can transfer itself very rapidly when sheep are in contact. For example, a single lousy ram can infest a whole flock in an incredibly short time.

The eggs, or "nits," which are of a dirty white colour, are attached to the wool by a sticky secretion. The young lice which hatch from them are very similar to the parents except in size, and moult several times before reaching maturity. The length of the life cycle varies considerably according to

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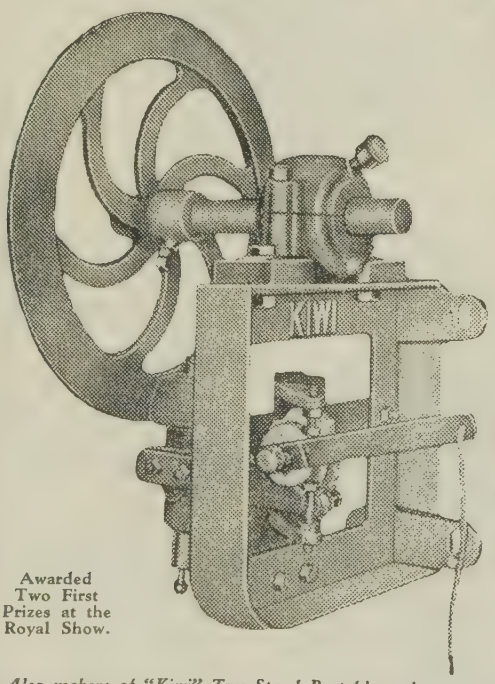

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conditions, but it is probably about three weeks under the usual conditions.

The symptoms of lousiness are rubbing, biting, scratching, and general uneasiness. The lice congregate near the skin, mainly on the upper parts of the neck, shoulders, back, and thighs; in other words, they are thickest where the sheep has the greatest difficulty in reaching them, although in bad cases they may be spread all over the body.

Other Species

Two other species of louse have occasionally been found in New Zealand, namely, the face-louse (*Linognathus ovillus*) and the leg-louse (*Haematopinus pedalis*). The former is extremely rare, and the latter, although found more often, is of little economic importance, as it causes the sheep very little inconvenience and is easily controlled by ordinary dipping. It is about twice the size of the ordinary red-headed louse (see Fig. 5), and is confined almost entirely to the sheeps' legs, where, being a blood-sucker, it remains relatively stationary.

The ked (*Melophagus ovinus*) is not a true tick, but an insect, a degenerate fly which has lost its wings and so become a permanent parasite on the sheep. It is shown in Fig. 6, but its rusty brown appearance must be familiar to all sheep men. Its mouth-parts are entirely adapted for sucking blood, yet, strangely enough, it seems to cause the sheep a good deal less irritation than the much smaller biting lice.

Lays No Eggs

Unlike most insects, the female ked lays no eggs. It retains the eggs within her body until each one is deposited as a fully-grown larva, which changes into the familiar pupa almost immediately after it has been attached to the wool by a sticky secretion. This smooth, shiny-brown, barrel-shaped pupa is about one-eighth of an inch long, and the colour of an apple pip.

When it hatches in due course it gives rise to the adult ked, which begins to feed almost immediately and, after mating, soon completes its life cycle once more. Here again there seems to be considerable variation in this period according to conditions, but it is approximately correct to place it between three and four weeks.

The habits of the ked and the symptoms of its infestation are in many ways similar to those described for the red-headed sheep louse. It, too, never purposely leaves its host except to transfer to other sheep when they are in contact, which it does very rapidly, and it is most numerous in similar parts of the body to the lice, but, being darker in colour and much larger, it is easier to see. On warm days the keds sometimes crawl up to the surface of the fleece.

Fig. 1.—Salving a sheep.

[*Photo from "Veld."*

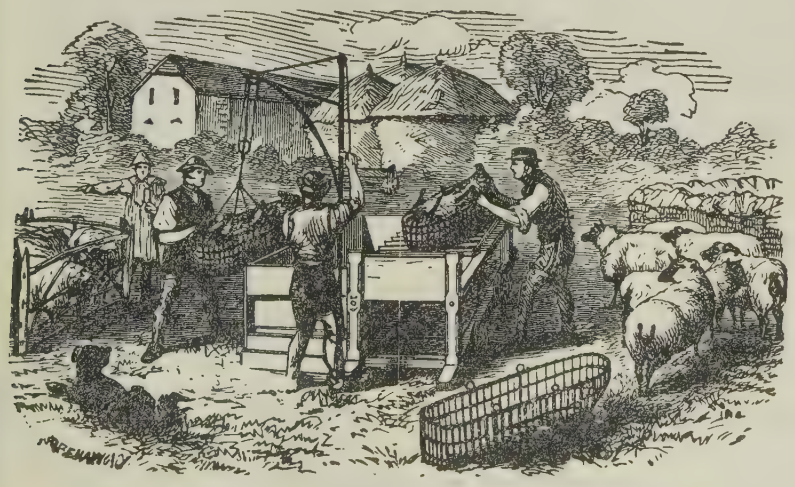

Fig. 2.—Sheep dipping in the early days.

[*Photo from "Veld."*

Infestation

Clean flocks of sheep frequently become infested with lice and/or keds in what appears to be a most mysterious fashion. Men or dogs (although not the normal hosts) may accidentally carry these parasites. Hence the wisdom of dipping all dogs at the same time as the sheep. Any goats on the property should also be dipped.

Sheep rubbing against a boundary fence may pick up parasites from bits of wool rubbed off by the neighbour's sheep, and stragglers getting through fences or sheep coming from a public saleyard are other potential sources of infestation.

Other sources of re-infestation are:—The practice of dipping rams, stud sheep, lambs, etc., at a different period from the dipping of the general flock,

failure to dip lambs and ration sheep, allowing neighbours to dip in your bath, travelling sheep along roads and stock routes, and the proximity of these to boundary fences.

It is interesting to note that the open-fleeced Lincoln type of sheep is most easily and soonest re-infested, while, conversely, dense-woolled sheep, such as Merinos, are much more difficult to re-infest, presumably because the parasites find difficulty in moving between the closely-spaced wool fibres.

Dipping Materials

Although there is not nearly such a variety of dipping preparations on the market in New Zealand as in some other sheep-raising countries, there are nevertheless enough different makes and types available to cause the novice to wonder just which one he ought to use. The following classification may be of some help in this respect.

The six main groups of dipping substances used in various parts of the world for dipping sheep are:—

Fig. 3.—A sheep infested with louse and tick. Note the torn and ragged condition of the fleece, due to rubbing.
[*Photo from Western Australia Department of Agriculture Bulletin.*

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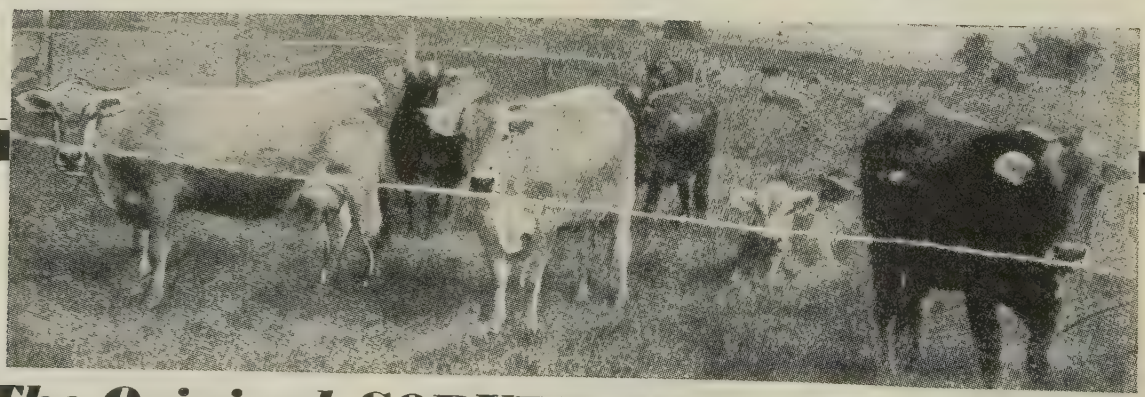

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(1) Arsenical.
(2) Cresol.
(3) Coal tar.
(4) Lime-sulphur.
(5) Nicotine.
(6) Various combinations of the above.

In New Zealand, because of the absence of scab, we are not concerned with class (5), and class (4) is seldom used nowadays because of its harsh effects on the wool and poor lasting qualities.

Very few, if any, farmers in New Zealand now attempt to make their own dipping materials, which is really false economy in any case, so that only the proprietary dips at present on the market have to be considered. These may be broadly divided into two main groups:—

A. Poisonous dips.
B. Non-poisonous dips.

It should be noted, however, that this classification is an arbitrary one, as there are on the market a few dips which combine the properties of both groups, and in any case the term "non-poisonous" is really a misnomer, for although these dips are relatively a good deal less poisonous than those in group A, they nevertheless contain poisonous ingredients which, under certain conditions, can be dangerous. Their mode of action on the parasites is, however, different, and this will be mentioned presently.

Fig. 4.—The red-headed sheep louse.
[*J. E. Duncan, Photo.*

Fig. 6.—The female sheep tick.
[*A. L. Bryant, Photo.*

A.—Poisonous Dips.

The basic ingredient used in all poisonous dips is the powerful poison arsenic, which may be present in various forms, such as arsenious oxide, sodium arsenite, arsenic pentoxide, and various sulphides of arsenic. Sulphur may also be present in the free state as well as combined with the arsenic, and usually these chemicals are associated with other ingredients, such as coal tar oils (namely, cresols and phenols), Derris resin, soft soap, etc., according to the particular type of dip which they constitute.

Poisonous dips may be further subdivided according to type into three groups, viz.:—

(1) Powders.
(2) Pastes.
(3) Fluids.

(1) The poisonous powder dips enjoy the greatest popularity of any type on the market at present, and most firms nowadays sell a quick-acting (Q.A.) type. These, in addition to sulphur and arsenic compounds, contain a Derris preparation, the active poisonous principle of which is known as "rotenone." Space does not permit any allusion to the interesting history of this substance. Suffice it to say that, while it is very toxic to all cold-blooded creatures (for example, its use as "Derridust" against garden pests), it is harmless to warm-blooded animals. Although soft water is preferable for use with all dips, the powder dips will work fairly satisfactorily even with hard water, **but they must be thoroughly mixed and kept agitated throughout the dipping.** When properly used they have considerable lasting power in the fleece.

(2) Poisonous pastes are also offered by quite a number of manufacturers, and of late years have become increasingly popular. They contain similar ingredients to the powders, and may also be of the quick-acting type, but the ingredients are compounded with soft soaps and certain oils so that they can be completely emulsified with water and do not require constant agitation once properly mixed, but in most cases it is essential that if the water is hard it be properly softened before use. The makers of the better class of these dips claim that by virtue of certain of their oily ingredients they have good lasting power in the fleece, and this seems to be borne out by results in practice.

(3) Poisonous fluid dips have little lasting power in the fleece, being much simpler in composition than those already mentioned. They have little to recommend them except their cheapness, and are largely being displaced by other types today.

B.—Non-poisonous Dips

The basic ingredients of non-poisonous dips are coal tar products obtained as by-products of gas manufacture, and are chiefly cresol (also known as cresylic acid or "liquid carbolic"), and other tar acids and tar oils. These fluids are not themselves soluble in water, but by adding emulsifying agents, such as a vegetable oil soap,

Fig. 5.—The sheep leg louse.
[*J. E. Duncan, Photo.*

it is possible to get them dispersed into extremely fine globules (like the butterfat globules in milk), which form a stable emulsion in water, and which do not separate out on standing.

Hard water interferes with this emulsifying action, and there is a danger of the concentrated cresol, etc., separating out and floating as a layer on top of the dip, where it can be very harmful, or even fatal, to the sheep.

When only hard water is available it is necessary to soften it by adding from 2lb. to 10lb of washing soda for each 100 gallons of water. If there is any doubt about the matter it can easily be settled by mixing the dip in miniature in a clean glass jar, using the correct proportions. If, after standing for an hour, an oily mass of globules appears either at the top or the bottom of the liquid either that water should be avoided or suitably softened before use.

The non-poisonous dips can be subdivided into two groups only:—

(1) Non-poisonous pastes.

(2) Non-poisonous fluids.

(1) The non-poisonous pastes may, in addition, contain the quick-acting ingredient Derris, which considerably enhances their value. Some makers claim to include special ingredients which make them miscible with hard water, but too much reliance should not be placed on these claims. They are quite effective against parasites, but have no lasting power in the fleece to protect against re-infestation. Whatever popularity is enjoyed by certain types is due in no small measure to the vegetable oils which they contain, leaving the fleece in very attractive condition.

(2) The non-poisonous fluids are effective only at the time of use, and have no lasting power. Their popularity is not great, and is waning.

Uses of Various Types

The various dips will be considered in the same order in which they have already been mentioned. For the main dipping, where a thorough kill of parasites and protection against re-infestation is required, only the poisonous dips are suitable, either in powder or paste form. Poisonous fluids have no lasting power, except in a prolonged spell of dry weather, and therefore cannot be considered suitable. At present the majority of users appear to prefer the powder dips, but certain of the paste forms are gaining rapidly in popularity.

It would be out of place here to enter into any further discussion on the respective merits of these types, as they each have their advantages and disadvantages, but there are few farmers who will not have had these

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eloquently pointed out to them by representatives of the various dip-manufacturing firms. The only safe guide is to make a practice of dealing only with reputable and well-known firms, and if a dip is found to give thorough satisfaction year after year there is little point in changing from it.

Both the non-poisonous types may be said to be designed for temporary dipping, and cannot be considered suitable for the main dipping. The pastes are usually high in cost, so that where it is desired to dip off shears as a protection against infection of cuts or for other temporary dipping, such as lambs about to be fattened on rape, or dipping prior to shearing, it will usually suffice to use a non-poisonous fluid. It is not intended to mention here any of the special types, such as bloom dips, which are marketed to fulfil a breeder's fad. As dips they have no special advantages, and it is a moot point whether anyone is ever deceived by the artificial colouring of the wool. From the wool point of view, possibly it does no harm, but certainly no good.

Action of Dips

Dips kill the parasites by acting on them in one or more of the following ways:—

(1) As stomach poisons.

(2) As respiratory poisons, entering through the spiracles (breathing pores).

(3) By absorption through the cuticle (outside "shell" of insect).

(4) By suffocation by closing the spiracles.

A. The poisonous types of dips act chiefly as stomach poisons, although absorption through the cuticle and spiracles probably also occurs to a considerable extent.

B. The non-poisonous dips kill mainly by suffocation, and are sometimes referred to as contact poisons. Derris induces immediate paralysis on contact, and ultimate death. The oils tend to stop up the spiracles, and also enter the body by this route.

With a slow-acting (the standard type which does not include Derris) powder dip, live parasites may be found the day after dipping, but this should not be taken as proof that the dip is ineffective, because these parasites will ultimately be poisoned when they feed. In the case of the non-poisonous dips (which depend on coal tar products for their action) and dips containing Derris, all parasites should be killed in 24 hours or less.

No dip has yet been devised which will sterilise **all** the "eggs" of both lice and keds, so that ultimately some of these will hatch out. For this reason —quite apart from the possibility of re-infestation—a good dip requires to give protection for a month after dipping, and to have a reasonable prospect of attaining this the sheep must carry a fair growth of wool at the time of dipping which will hold, and continue to hold, the poisonous ingredients.

When To Dip

The time of dipping is largely governed by the Stock Act, which stipulates that, with certain exceptions (set out in detail in the Act), all long-wool and crossbred sheep shall be dipped each year in the North Island between January 1 and March 31, and elsewhere than in the North Island between January 1 and April 30. However, within the stipulated period there are a number of factors which govern the actual date of dipping:—

(1) The Date of Shearing.—Nearly all dip manufacturers recommend dipping merinos at least four (preferably six) weeks after shearing, and for crossbreds not sooner than two months after shearing. The reason for allowing these lengths of time is to allow sufficient wool to grow to carry out a good quantity of dip. The Merino fleece, being so much denser, does not need the same length to hold enough dip, and because of its very greasy nature too much growth of wool could prevent proper penetration of the dip right down to the skin. Although the practice is rarer in this country than in Australia, some owners dip straight off the shears in a carbolic (non-poisonous) dip as a protection against infection of shear cuts, and then later at the proper time give a second dipping in a poisonous dip. Dipping sheep with open wounds on them in a wash that has been allowed to become dirty is worse than useless. It has been proved that bacteria can live in a dirty dip, particularly of the arsenical (poisonous) type, and infect sheep suffering from cuts, abrasions, or dog bites with blood poisoning, which rapidly proves fatal.

(2) Climate and Altitude.—These factors will also have to be considered to ensure suitable weather for dipping.

(3) Shelter.—The shelter available has its influence, as excessively hot sunshine or cold winds should be avoided.

(4) Neighbours.—If possible, a farmer should dip about the same time as his neighbours to lessen the risk of re-infestation.

(5) Public Dip.—Where the farmer uses a public dip or a neighbour's dip, he will usually have to take his turn, and cannot then always dip at the most suitable time.

(6) Water Supply.—A drought may make dipping temporarily impossible, and there are certain provisions in the Stock Act allowing an extension of time to cover this contingency.

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Dairy Factory Payments

Practice of Short Crediting Condemned; Suggested Amendments To Present System

W. M. SINGLETON, Director of Dairy Division, Wellington.

SINCE the inception of the manufacture of cheese and butter on the factory system, the question of giving correct credit to suppliers for pounds of milk, cream, and butterfat has been evergreen. Payment by test was adopted in the early days of New Zealand dairy factory manufacture, and allegations of short credit on tests or weights, or both, have been coming forward since that time. It would appear that some factory managers have been visiting the sins of the fathers on the children for one or two generations, and that they may continue to the biblical three or four generations unless an amendment to the present system of crediting be made.

The great majority of the companies are evidently endeavouring to give their suppliers approximately right credit. It is not these companies which have inspired me to bring the general question forward, but there are a number of creameries and cheese factories evidently in the race for yield, some voluntarily, and some for self-protection, but probably they represent not more than 16 per cent. of the total.

Co-operative Ownership

Practically all the creameries and cheese factories in New Zealand are co-operatively owned, and it is recognised that, although short credits may be given by some managers, it makes no difference to the total amount of money which goes to that manufacturing dairy's suppliers as a whole. The manager of a co-operative factory obtains no monetary gain from short credits. The most outstanding reason that now presents itself in favour of amending the present procedure is that of unfair competition from some manufacturing dairies.

There is no desire on our part to do anything which will militate against efficient work on the part of the manager and his staff, and this factor is to be duly protected. It is suggested, however, that the time is ripe to consider ways and means of preventing managers from getting credit for efficiency to the extent that this is due to a capacity for receiving butterfat without crediting it to suppliers by weights or tests or both.

The custom of certain dairy companies of short crediting suppliers either by weights or tests, or both, is condemned in this article by the Director of the Dairy Division, who states that moral suasion has failed to rectify this unfair practice. It is suggested that amendments should be made to the present system of crediting which would make it obligatory for correct credits to be made.

When butterfat is short credited it is inevitable that on a percentage basis some suppliers are penalised more than others. This imparts an element of unfairness in spite of the fact that the total money distributed may not be affected.

Inaccurate Instruments

Inaccuracies in milk and cream weighing scales and cream testing balances affect the yield as per lb. of butterfat. When these inaccuracies are exerting an influence towards a lower yield there appears to be a greater urge for early correction than when the variation tends towards a higher yield. Perhaps this inconsistency is merely in accord with human nature, but the fact remains that the great majority of variations in scales and balances which come under the notice of the Dairy Division are in favour of a higher yield or tend to cause butterfat to be received without being credited to the supplier.

The Dairy Division has been carrying out a good deal of check testing at dairy factories. Glassware tested and marked is used by dairy companies, but manufacturers of test bottles have to be allowed some tolerance when considering the graduations on the test bottle. These variations are both plus and minus. The check testing officers' test bottles are very carefully selected, and only those considered to be absolutely accurate are used for checking dairy factory testing.

If the factory testing be done accurately and the results recorded honestly, the check tests should show some factory tests to be the same as the check tests and others above and below the check tests, and these variations should be within the limits of tolerance allowed at the time of testing the bottles and marking them correct. Over a large number of comparisons, according to the laws of chance, the plus variations and the minus variations due to the calibration of the bottles should be equal.

Check Tests Reviewed

A review of over 4000 check tests shows that where there is one variation in favour of the supplier there are four in favour of the company. This is not to suggest that in all cases there is a deliberate attempt to beat the supplier. In many instances, it is rather a case of making sure that the yield does not suffer by giving the supplier the benefit of the doubt.

The check testing has done much good by way of ensuring efficient and accurate testing appliances and more efficiency and less carelessness in carrying out the work of testing, but it has its limitations, and is inadequate to the present position. Further, the check testing officer has not control of

the factory samples, and it has been alleged that water has been added to factory samples before they were tested by the factory staff. The factory testing officer could then afford to read his tests liberally, and the check testing officer's tests would show nothing wrong. A more definite system of checking up appears to be necessary in connection with the work of some manufacturing dairies, and it is believed to be available.

Routine work at grading stores now includes the testing of a box of butter from each churning for water and salt, and periodically testing a composite sample of a day's churnings for percentage of curd. The aggregate of these percentages subtracted from 100 leaves the percentage of butterfat in the butter. A composite sample from a cheese from each vat in each consignment to the grading store is tested for butterfat. Each month figures are supplied to the graders by dairy company secretaries indicating the number of pounds of butterfat credited to suppliers, and the number of pounds of butter or cheese made. The number of pounds of butter or cheese made multiplied by the percentage of butterfat contained therein and divided by 100 would give a result indicating the pounds of butterfat recovered in the manufactured product. There are now practically no legal gains in weighing and testing.

"Legitimate Gains"

It is generally known that regulations within the last few years have dealt with those so-called "legitimate gains" of earlier years. Any advantage on tare weights of cream cans now legally goes to the supplier and offsets largely any gain which the company receives from the fraction of half pounds in weighing can and cream. In cream testing where the fat column shows over the half per cent., say 40.6, 7, 8, or 9, the legal test must be recorded at 41 per cent. The same principle applies in the testing of milk. These earlier so-called legitimate gains can now no longer be logically advanced as a satisfactory explanation of an unjustifiably high yield.

It is known that neither butter nor cheese can be made without some loss of butterfat, and the efficient manager endeavours to keep these losses down to a minimum. Much experience indicates that fairly good work is being done if for every 100 lb. of butterfat received a manager retains in the butter from farm separated cream 98 lb. of butterfat; in the butter from milk delivered to skimming stations, 96 lb. of butterfat; and in cheese 93 lb. of butterfat.

Our desire is to give companies and managers credit for all the efficiency the manager and his staff put into their work, and instead of using the foregoing percentages of butterfat recovery we suggest a further 1 per cent., and assume that from every 100 lb. of fat delivered in farm separated cream 99 lb. of fat are recovered in the butter; from every 100 lb. of fat delivered in milk to skimming stations, 97 lb. fat are recovered in the butter; and for every 100 lb. of butterfat delivered in milk to cheese factories 94 lb. are retained in the cheese. Experience during later years might suggest some slight reduction to these percentages.

Knowing the pounds of butterfat recovered in the butter or cheese made during the month, and using the foregoing percentages of recovery, it is

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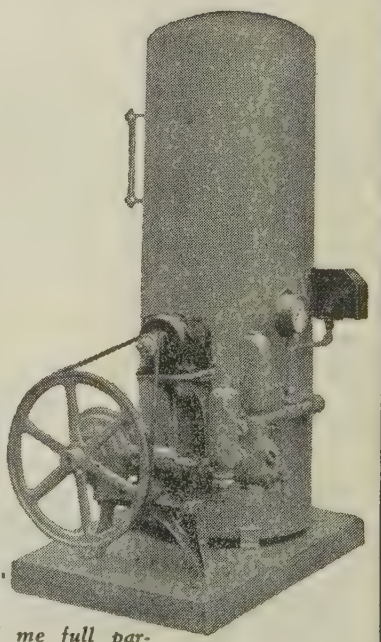

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easy to calculate the approximate minimum number of pounds of butterfat received for the month. If there has been short crediting, the total number of pounds of fat credited subtracted from the calculated pounds of butterfat received will give an indication of the calculated number of pounds of butterfat short credited.

Amendment Suggested

It is considered that the suggested amendment would, if enacted, become operative so far as a dairy company is concerned at the end of the company's financial year, but not for the 1938-39 season. The dairy company, before calculating its payout and yield as per pound of butterfat for the season, would be required to furnish the grader with a return certified by the auditor showing pounds of fat credited to suppliers and the pounds of butter or cheese made for its financial year. The dairy produce grader should then supply the dairy company with an indication of the number of pounds of butterfat short credited, and the company should add the pounds short credited to the number of pounds of butterfat credited to arrive at the total pounds of butterfat received. The total number of pounds of butterfat received divided into the total pounds of butter or cheese made and into the total money paid out would give the yield and the payout respectively as per pound of butterfat for the seasonal year.

For example, in nine months a certain cheese factory made 1,695,529 lb. of cheese and credited its suppliers with 626,803 lb. of butterfat. Let us suppose that these are the full season's figures and that this factory announces at the end of the season a payout of 17d per pound of butterfat. Its yield on the above figures is 2.70 lb. of cheese per lb. butterfat.

Effect of Amendment

If the suggested amendment were operative, this factory would add to the credit of 626,803 lb. fat a further 24,041 lb. fat short credited, making a total of 650,844 lb. fat received. On these figures the yield would then be shown in the balance sheet statistics as 2.60 instead of 2.7, and the payout as 16.37d. per pound of butterfat instead of 17d. It is only these lower figures that the fat content of the cheese would justify.

Supposing a competing cheese factory had given due credit to its suppliers and paid out 16.37d. The short crediting factory has actually paid its suppliers the same per lb. of fat received, and yet on the present system gets credit for paying 0.63d. more.

Another example is that of a creamery which we have been endeavouring to get into line for years. Years ago, I pleaded with the present manager of this creamery to give his then suppliers more of the benefit of the doubt in connection with credits for butterfat delivered. The dairy instructor of the district met the directorate of the creamery which this man is now managing, and subsequently I met this directorate, which I have no doubt understands the position clearly. When we were leaving the board room the chairman told me he hoped he would never see me back again, and I have no doubt but that it was not intended as a compliment.

Further Examples

This creamery from August to April inclusive this season made 2,054,920 lb. of butter and credited its suppliers with 1,658,042 lb. butterfat. Let us again suppose that these are full season's figures, and that this creamery announces at the end of the season a payout of 15d. per lb. of butterfat. Its over-run on the above figures is 23.90 per cent.

If the suggested amendment were operative this creamery would add to the butterfat credited a further 37,046 lb. of butterfat short credited, making a total of 1,695,088 lb. butterfat received. On these figures, based on fat

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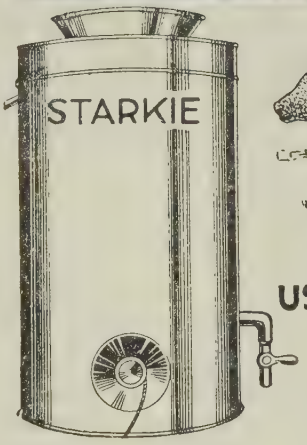

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content of the butter, the over-run would then be shown on the balance sheet as 21.22 per cent. instead of 23.90 per cent., and the payout as per lb. of butterfat would be shown as 14.672d. instead of 15d.

If, during the season, a company made a deliberate attempt to get an unjustifiably high yield and exceeded the percentages of recoveries indicated above by a percentage to be determined, say for purposes of illustration one-half of 1 per cent., then such a company could be made to show on its report and balance sheet its percentage and number of pounds of butterfat short credited. This would probably act as a sufficient deterrent.

Few Companies Affected

It is not suggested that the present check testing be abandoned. Its continuance is justified, and covers a big percentage of what is required. Experience would doubtless show that the great majority of companies would not be affected in the slightest by the suggested amendment. So far as they are concerned, it would be inoperative. Those participating in the race for yield above that which can be justified would be affected. It is not claimed that the suggested amendment is absolutely perfect. For instance, it would not take into consideration varying quantities from different churnings of butter or vats of cheese. It is contended, however, that it would be a big improvement where conditions are such as to bring it into operation.

The following figures are on a basis of 100 lb. of butterfat recovered in butter and 93 lb. of fat recovered in cheese for every 100 lb. credited to suppliers for nine months August-April 1938-39 season. A creamery or cheese factory which on the foregoing basis had a recovery of 100 per cent. or more for not more than three separate months is classed as good; for four to six separate months is classed as fair, and for seven or more separate months is classed as bad.

	Numbers			Total per cent.	Percentage		
	Good	Fair	Bad		Good	Fair	Bad
Creameries	60	58	30	148	40	40	20
Cheese Factories	165	75	37	277	60	27	13
Totals and average percentages	225	133	67	425	53	31	16

Standard Over-run

It will be noted that the pounds of butterfat short credited are based on the butterfat recovered in the resultant butter or cheese. A standard over-run has been discussed, but it is out of the question entirely for cheese and is not as satisfactory for butter as is the method suggested. Our suggestion gives due credit to the manager who makes a low butterfat butter, and his company is entitled to such advantage. This makes the suggestion very fair to those concerned and much to be preferred to a standard over-run.

Race for Yield

It is obvious from figures which came before me that a number of dairy companies are in the race for yield, and that while many of their managers are doing efficient work by way of keeping down losses, a portion of the nominal yield can only be explained by the receipt of that portion of the butterfat which is not credited. This creates unfair competition and induces competing factories to follow their lead.

For part of the 1937-38 season a cheese company apparently gave suppliers credit for all butterfat received. Its competing creamery for nine months this season had over-runs averaging 23.90 per cent., and apparently received 102 lb. butterfat for each 100 lb. credited. This season for the corresponding period the cheese factory apparently received 102 lb. butterfat for every 100 lb. credited, thus degenerating to the level of the creamery's practice. Last spring the chairman of the cheese company explained to me his company's position indicating the difficulty for a cheese company to pay out the 2d. differential over butter with a competing creamery getting an over-run so high that it could not be justified. Apparently the creamery manager is a magician, and the cheese factory manager had to act likewise.

There are extreme instances of other creameries for which the company's figures show that the number of pounds of butter made for the month could not be made from the butterfat credited and be a legal butter containing the legal minimum of 80 per cent. of butterfat. Analyses showed that the butter contained in the vicinity of 82 per cent. butterfat, so that the difference of about 2 per cent. represented butterfat received and not credited.

Losses in cheese-making are usually assessed at about 7 per cent. of the butterfat received, and extreme cases which have come under review show more butterfat retained in the cheese in spite of manufacturing losses than was credited to the suppliers. The short credit in such cases amounted to more than the losses in manufacture. Other figures vary from these down to normal or below normal.

The general figures for most companies represent an attempt to do what is right with some bias towards the company. There are some figures which are below normal and may represent avoidable or unavoidable losses or too high a credit to suppliers, either by weights or tests or both. These cases are not affected in the slightest by the suggested amendment for adding short credits, and present efforts to overcome avoidable losses or to get the cause of low yields corrected should be continued.

Suasion Has Failed

During more recent seasons we have, through the services of the butter and cheese instructors, been endeavouring to get those creameries and cheese factories with abnormally high yields into line. Some have responded very well, others have responded for a limited period, and on others no impression worth while has been made. Moral suasion has been given a sincere trial and failed.

Legislation would be required before effect could be given to our suggestion. When that legislation could be obtained if the suggestion be approved I am unable to state. In the meantime, it seems desirable that the suggestion should be more widely discussed.

To sum up, it is suggested that, as a number of dairy companies are endeavouring to get an abnormally high yield of butter or cheese as per lb. of butterfat by short crediting suppliers either by weights or tests, or both, and as this creates unfair competition and a demoralising influence on adjoining companies, the time is ripe for serious consideration by the industry of an amendment to the present system of figuring the average seasonal yield and the average payout respectively as per lb. of butterfat. The yield and the payout as shown on the annual balance sheets should be based on the pounds of butterfat received, and as for those creameries and cheese factories which have been short crediting suppliers the pounds of butterfat received is the total of that credited and that short credited.

It is further suggested that, where recoveries representing in butter from farm-separated cream more than 99½ per cent., from milk at skimming stations more than 97½ per cent., and from

milk for cheesemaking more than 94½ per cent. of the butterfat credited to the suppliers are realised, the balance sheet should show the number of pounds of butterfat short credited and the percentage which this represents of the total.

Those short credits which correspond to recoveries below the last figures indicated above need not be shown as a special item on the balance sheets, but would be included in the total butterfat received.

Judicious criticism is desired, whether it be constructive or destructive.

Identical Twin Heifers

Top.—The twin heifers and the dam.

Right.—A striking view of the twin heifers.

Contributed by the DAIRY DIVISION.

TWO Jersey heifers which appear to be identical twins—a somewhat rare occurrence in cattle breeding—have come under the notice of one of the Dairy Division instructors, Mr. J. B. Sawers. The present example is particularly interesting in view of the fact that production figures are available to support the claim.

The heifers are owned by Mr. R. H. Wells, of Tokaora, near Hawera, who kindly supplied the following details.

The sire of the heifers is unknown, the dam having been purchased from a dealer. They both calved for the first time in 1935, and are now in their fourth milking season. The progeny has been a heifer and a bull calf each year, alternately, and a daughter of one is now in milk.

Mr. Sawers, who inspected the heifers, states that on appearance they are both of the same type. They both have the same shaped heads and bodies, the same shaped udders, the same slight outward turning of the front feet (the mother has the same tendency), and the same shaped horns, the near-side horn of each being slightly turned in. Moreover, they have the same temperament, and always stay together in the paddock.

This season one of the heifers is not in calf, but in previous seasons there has been no trouble with them in that respect.

Their butterfat production is as follows:—

Season	Dill		Daffy	
	Days	Fat	Days	Fat
1935-36 ..	282	230	292	244
1936-27 ..	371	268	365	262
1937-38 ..	Not tested.			
1938-39 ..	290	184	271	175

It will be apparent that if the yields are converted to the same number of days there is practically no difference in butterfat production.

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Summary of the 1938-39 Season's Work

Contributed by the DAIRY DIVISION.

THE unseasonable spring of 1938, following the severe winter of that year, caused a decrease in Certificate-of-Record entries for last season, and entries for Government Official Herd-Testing, which is an adjunct of the C.O.R. system, were therefore lower.

All things considered, however, the position may be regarded as very satisfactory, inasmuch as cows tested under the Government O.H.T. system for the year ended September 30, 1939, totalled 2,111, a decrease of only 73 cows over the previous year's total of 2,184. Since the system was introduced 12 years ago, 23,098 statements of seasonal production have been issued, which represents a yearly average of 1,924 cows. During the season under review cows were tested by 178 breeders, as compared with 203 breeders for the year ended September 30, 1938. It is therefore obvious that there has been an increase in the average number of cows entered by each testing breeder, although a somewhat marked falling off in the number of breeders who supported the system.

During the peak month of the season 237 breeders were testing cows under the Certificate-of-Record test, indicating that 75 per cent. of our testing breeders made entries in the Government Official Herd-Test. The 23,098 statements issued represent 15,790 different cows, 7,308 of which have been tested more than once, while several have been tested nine times or more.

The production tables appearing in this survey are based on all cows on test for 180 days (six months) or more, the Government Official Herd-Test being a 305-day (10 months) test. In addition to the registered purebreds, 29 grade cows were tested by special arrangement, compared with 37 during the previous season. These, and 174

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purebreds on test for less than 180 days, are not included in the table.

To enable comparison, the following figures relating to average butterfat production for the various cow-testing systems in operation in the Dominion are given:—The average of cows on group and association herd-test for the 1938-39 season, based on all cows in milk 100 days or more, was 232.00lb. fat in 240 days. **On the same basis,** the Government Official Herd-Test average was 296.68lb. fat in 266 days, the Certificate-of-Record 305-day Test average was 454.98lb. fat in 299 days, and the Certificate-of-Record 365-day Test average 504.70lb. fat in 340 days.

Standard Specification for Pollard

THE New Zealand standard specification for pollard, published by the Standards Institute and developed by a representative committee with the concurrence of all affected parties, is designed to meet the wishes of users and the desires of the millers by providing a medium for determining the quality of pollard.

The specification stipulates a maximum crude fibre content and a degree of fineness, with methods for mechanical and chemical analyses to verify these factors.

To the user it is an instrument for specifying purchases of pollard to a desired quality. To the miller or supplier it is an instrument whereby he can satisfy himself that a given order will meet the requirements of the purchaser.

Copies of the specification (N.Z.S.S. 274) can be obtained from the New Zealand Standards Institute, Hamilton Chambers, 201 Lambton Quay, Wellington, C1. Price 2/- nett. post free 2/3d.

Table 1.—Official Herd-Testing in Past Two Seasons on Basis of all Cows on Test for 180 Days or More.

Breed.	Number of Breeders.	Number of Cows.	Average Yield for Season: Days.	Milk.	Butterfat.
Season 1937-38					
				lb.	lb.
Jersey	176	1,527	280	6,117.9	331.93
Friesian	20	362	276	9,050.2	323.86
Milking Shorthorn	6	58	271	6,489.9	273.88
Ayrshire	2	39	282	7,649.4	350.45
Red Poll	*	*	*	*	*
Guernsey	*	*	*	*	*
Shorthorn	*	*	*	*	*
Totals & averages	203†	1,986	279	6,693.3	329.13
Season 1938-39					
Jersey	149	1,457	273	5,611.5	303.47
Friesian	21	360	269	8,497.5	307.19
Milking Shorthorn	7	44	245	6,066.1	257.28
Ayrshire	3	47	275	7,434.7	322.39
Red Poll	*	*	*	*	*
Guernsey	*	*	*	*	*
Shorthorn	*	*	*	*	*
Totals & averages	178†	1,908	272	6,211.5	303.57

* Not represented. † Totals do not agree, as one breeder tested more than one breed.

* Not represented. † Totals do not agree as two breeders tested more than one breed.

Table 2.—Average Production in Classes and Breeds for all Official Herd-Test Cows.

Class.	Season 1937-38. Number of Cows.	Average Days.	Average Milk.	Average Butterfat.	Season 1938-39. Number of Cows.	Average Days.	Average Milk.	Average Butterfat.
			lb.	lb.			lb.	lb.
Jersey—								
Two-year-old and under	585	280	5,475.6	297.79	579	271	4,882.8	263.81
Three years	331	278	6,149.0	334.89	279	273	5,762.3	312.32
Four years	229	285	6,597.2	360.30	198	278	6,365.5	349.92
Mature	382	280	6,787.2	364.65	401	274	6,186.6	331.65
Friesian—								
Two-year-old and under	78	281	7,289.4	270.22	104	269	6,952.9	259.31
Three years	75	275	8,841.2	314.32	53	276	8,543.5	315.12
Four years	64	272	9,205.8	323.75	56	273	8,991.9	322.66
Mature	145	276	10,036.8	357.70	147	265	9,385.4	332.32
Milking-Shorthorn—								
Two-year-old and under	22	279	5,514.1	232.59	9	255	4,928.5	210.17
Three years	11	275	6,447.7	264.52	12	231	5,516.3	238.96
Four years	8	267	7,231.7	305.37	12	240	6,041.8	258.90
Mature	17	260	7,431.0	318.56	11	257	7,623.1	313.12
Ayrshire—								
Two-year-old and under	10	271	5,885.0	271.58	13	274	6,772.4	285.05
Three years	6	293	7,423.1	330.79	6	266	7,190.3	298.69
Four years	4	301	9,266.5	430.81	4	288	7,983.0	367.73
Mature	19	281	8,309.0	381.24	24	276	7,763.1	340.98

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Autumn-sowing of Lucerne

High-producer of First-grade Feed As Ensilage

IT is customary in most parts of New Zealand to sow lucerne in the spring, but in many localities, such as the Auckland Province, really excellent results can be obtained by the sowing of this most valuable fodder crop in the autumn. Generally speaking, it will be found that where the autumn-sowing of clovers is a sound practice, lucerne also can be established successfully, provided, of course, that soil conditions suit the crop.

In the Eastern Bay of Plenty there are a number of excellent autumn-sown lucerne stands, and, as a matter of fact, many farmers will not attempt a spring sowing because of the many difficulties connected with weed control on the one hand, and, on the other, the fact that the hot, dry summers which frequently follow almost immediately the sowing of the seed renders establishment a somewhat precarious undertaking.

— By —
C. R. TAYLOR,
Fields Instructor, Whakatane.

Lucerne is a high-producer of first-grade feed, and, in any efforts to increase animal products, farmers with suitable areas might well consider sowing lucerne in the coming autumn.

For the purpose of autumn-sowing the seed should be sown early in March in order to secure plants that are well established before the cold winter weather sets in. At time of seeding it is often advantageous to sow, in addition, a bushel of barley or oats or 10lb. to 15lb. of Italian ryegrass to act as a nurse crop to the young lucerne plants during their first winter. Such a practice also ensures freedom from weeds and a heavy cut or two of green material the following spring. This is usually made into ensilage, as frequently the weather conditions so early in the season are not altogether favourable for haymaking.

"King of Fodder Crops"

Lucerne is often referred to as the "King of Fodder Crops," and richly does it merit such recognition. Its yield per acre is extremely high—often in the vicinity of six to seven tons of dry material—and its food value, when well saved, ranks superior to that of the best meadow pasture. As an illustration of this, it can be stated that in

Photo Above — The first cut of autumn-sown lucerne with a nurse crop of Italian ryegrass at 15lb. per acre. Note the vigour and heavy yield of both the lucerne and the ryegrass. The soil is river alluvium and shingle.

yield and food value the annual production of animal nutriment from, say, five acres of lucerne, is equivalent to approximately 25 to 30 acres of well-saved meadow hay.

It is not to be wondered at, therefore, that many of the great American Republics talk of lucerne (alfalfa) not in thousands of acres but actually in ten of millions. These people know the undoubted value of lucerne—have known it, in fact, for very many years—and to back up their high admiration of the plant they are still establishing it in hundreds of thousands of acres annually.

Lucerne definitely has merit of the highest order as a foodstuff for our domestic animals, and yet we in New Zealand sadly lag behind many other countries in this respect.

Main Causes

The reason for this is probably due to three main causes:—

(1) Lack of appreciation of the extremely high food value of lucerne.

(2) The wealth of pasture growth in a normal season being thought sufficient when conserved as hay and ensilage for all winter needs; and

(3) An unjustified impression among farmers that lucerne is difficult to establish and maintain.

Of the three causes mentioned, it is believed by the writer that the last one is principally responsible for the average farmer's lack of enthusiasm towards lucerne, and yet lucerne establishment today is, under suitable soil and climatic conditions, hardly more difficult, if at all, than the sowing of a turnip crop, for instance.

Simple Procedure

In the early day it is quite admitted that lucerne establishment was, generally speaking, rather an arduous task, for it not infrequently happened then that farmers had to cart hundredweights and sometimes tons of inoculated soil from a neighbour's lucerne paddock, often some miles away. Nowadays, however, this same amount of bacteria is contained in small bottles measuring only ounces, and one has merely to mix the contents of the bottle thoroughly with the lucerne seed according to simple directions, and then sow as one would, say, turnip seed.

Nothing really could be easier and yet productive of such excellent results. Seed merchants or any branch of the Department of Agriculture would be pleased to secure for farmers the necessary quantity of lucerne culture on application, and at the same time give details concerning its use. Simple directions are also attached to the bottle containing the culture.

The first cut of a second-year stand of lucerne which was also planted in Italian ryegrass the previous autumn after the last cut had been taken. Note the freedom from weed growth. The soil is Tarawera pumice ash of fairly good quality.

Six Requirements

The next requirements of lucerne are:—

(1) A reasonably open and fertile soil and subsoil, thereby permitting deep penetration of the long taproot of the plant.

(2) A soil reasonably supplied with humus and moisture, but under no consideration should it be waterlogged.

(3) A soil well supplied with lime, as lucerne must have a sweet medium in which to develop normally. One ton of lime per acre should, generally speaking, be worked into the top soil before sowing the seed. Very peaty soils are unsuitable for lucerne.

(4) The seed bed preparation requires to be thorough, and consolidation by rolling is an important factor.

(5) If possible, select a piece of old pasture land to prepare for lucerne rather than a previously cropped area. This will ensure a comparative freedom from troublesome weeds while the young lucerne plants are establishing, and at the same time supply valuable humus.

(6) Provide from 3 to 4 cwt. of fertiliser (preferably super) per acre, but never sow inoculated lucerne seed directly with super, as this practice tends to kill the bacteria adhering to the seed.

Preparing the Land

Having selected a suitable piece of land and thoroughly prepared the seed bed, lightly work into it most of the lime (referred to above) and superphosphate (if used), keeping back about 1cwt. of each, which should be well mixed together a few days before sowing the seed. This latter mixture can then be safely used in sowing the inoculated lucerne seed either through a drill (7in. rows) or through the manure distributor.

For drilling purposes, 15lb. to 18lb. of seed may be used per acre, or, if broadcast, up to 25lb. If autumn-sown, a nurse crop of barley, oats, or Italian ryegrass (as previously referred to) may also be sown. After sowing, the seed should be lightly brush-harrowed, but only lightly.

The subsequent treatment of lucerne largely depends on circumstances. If tall-growing annual weeds which are likely to cause a smother are at all troublesome, they should be mown fairly high and raked off the field. If, on the other hand, weeds do not present any difficulty the lucerne should be allowed to grow until small shoots are observed issuing from the crowns of plants (usually beginning to flower at this stage, but not always) and then cut either as hay or ensilage.

The first cut of the season is frequently more conveniently made into ensilage, as explained earlier in this

article. A vigorous first-year stand of lucerne planted in the autumn should be capable of providing three or four cuts, depending on local conditions.

Maintenance

The management of established lucerne stands should mainly be directed towards weed suppression and the maintenance of a high degree of vigour in the plants. To the latter end a good topdressing should be given in the early spring just before the lucerne starts into growth, and again, if the weather permits, after the second cut has been taken.

Lucerne is naturally a very high yielder of nutritious fodder under suitable conditions, and so it becomes necessary to keep those conditions at a sufficient level of efficiency with topdressing, etc., if the plant is to produce to capacity. Just as a high-producing animal is usually a hungry feeder, so also is the high-producing plant.

Weeds are best dealt with during the hot summer months, say, between the second and third cuts, and the implement used should be either of the spring-tooth type or a tine harrow with narrow, well-drawn-out tines. The disc harrow is unsuitable for this work because of its severity.

Another useful method of weed control is that of sowing oats, barley, or Italian ryegrass in the lucerne after taking the last cut, that is, about April. If this practice is adopted a good harrowing should first be given and the seed sown with some manure. Such a method effectively controls weed growth over the winter period, gives an immense bulk of green material for the first and frequently the second cuts, and does not seriously compete with the lucerne.

Wise Investment

On all farms the carrying capacity is largely governed by their ability to winter stock, and especially is this so in the case of dairy farms where there is normally very little trading in livestock. Thus, to winter stock **adequately** without lucerne it becomes necessary to set aside large acreages of pasture land each year for periods ranging from between three and four months to provide for winter feed. This, in turn, seriously reduces the number of animals that can be grazed during the productive season, and so reduces income.

If, therefore, a much smaller area of lucerne will provide the same nourishment equivalent it is evident that a greater number of stock can be carried at a time when they are most profitable. Hence, where lucerne can be grown—and it will tolerate a wide range of soil and climatic conditions—it is a wise investment to make. Especially is this the case at the present time when, with our country at war, we are asked for greater efforts to increase production.

Slaughterings of Stock

THE following returns of slaughterings of stock at meat-export slaughterhouses and abattoirs for the eight months, May-December, 1939, has been compiled by the Livestock Division:—

District	Cattle	Calves	Sheep	Of which Ewes were	Lambs	Swine
North Island						
Meat-export Slaughterhouses—						
Auckland	96,501	570,760	65,951	30,982	369,629	118,273
Poverty Bay-Hawke's Bay	21,912	60,182	147,574	41,641	717,677	11,596
Taranaki-Manawatu ..	52,391	226,163	74,007	37,076	453,602	69,883
Wairarapa-Wellington ..	16,967	18,139	70,684	21,082	305,331	14,268
Totals	187,771	875,244	358,216	130,781	1,846,239	214,020
Abattoirs	80,021	26,179	322,799	169,386	48,581	70,380
North Island Totals ..	267,792	901,423	681,015	300,167	1,894,820	284,400
South Island						
Meat-export Slaughterhouses—						
Nelson-Marlborough ..	618	9,770	6,078	2,136	39,111	3,832
Canterbury	7,169	40,682	162,000	116,249	692,151	18,268
Otago-Southland	3,527	40,343	63,492	40,328	609,492	2,747
Totals	11,314	90,795	231,570	158,713	1,340,754	24,847
Abattoirs	37,240	8,968	184,247	388,526	27,739	18,772
South Island Totals ..	48,554	99,763	415,817	247,239	1,368,493	43,619
Dominion						
Meat-expt. Slaughterhouses	199,085	966,039	589,786	257,192	76,320	89,152
Abattoirs	117,261	35,147	507,046	289,494	3,186,993	238,867
Grand Totals	316,346	1,001,186	1,096,832	546,686	3,263,313	328,019
Same Period, 1938: Meat-export Slaughterhouses and Abattoirs ..	312,587	967,442	1,190,208	625,502	3,048,530	448,295
Same Period, 1937: Meat-export Slaughterhouses and Abattoirs ..	321,999	1,019,524	1,012,495	503,021	3,259,617	504,077

Slaughterings of Pigs

Contributed by the LIVESTOCK DIVISION.

The 70,822 pigs killed during November were distributed in weight range as follows:—

Under 60 lb.	57
61-100 lb.	10,825
101-120 lb.	13,740
121-160 lb.	37,459
161-180 lb.	6,293
Over 180 lb.	1,821
Sundries	677

Most of the pigs under 100 lb. were killed in abattoirs, and almost entirely used for local consumption. The grading figures for pork were 92.5 per cent primes and 7.5 per cent. seconds; for bacon, 70.9 per cent. Prime 1, 19.4 per cent. Prime 2, and 9.4 per cent. second quality.

The 72,893 pigs killed during December were distributed in weight ranges as follows:—

Under 60 lb.	459
61-100 lb.	10,095
101-120 lb.	12,060
121-160 lb.	36,787
161-180 lb.	9,347
Over 180 lb.	2,070
Sundries	2,075

The majority of pigs under 100 lb. have been required for local consumption. The grading figures for pork were 91 per cent. primes, 9 per cent. second quality; for bacon, 66.5 per cent. Prime 1, 23.6 per cent Prime 2, and 9.9 per cent. second quality. The lower percentage of No. 1 prime is probably due to greater numbers of heavy weight pigs being killed this month.

The grading in the different weight ranges are as follows:—

101-120 lb. gives 84%, 10.3%, 5.7% of P.1, P.2, and 2nd quality respectively.
121-160 lb. gives 65.5%, 24.8%, 9.7% of P.1, P.2, and 2nd quality respectively.
161-180 lb. gives 51.5%, 34.6%, 13.9% of P.1, P.2, and 2nd quality respectively.

Grasses and Clovers of New Zealand

Species on Areas of Low Fertility

— By —

S. H. SAXBY,

Instructor in Agriculture, Dunedin.

Fig. 50.—Typical browntop country in South Otago. On the right of the fence line can be seen the type of pasture common to much of this type of country. It is mainly low-producing browntop-fescue, with some tussock and rushes. On the left are various types of high-producing permanent pastures which have been made possible by the use of permanent strains of grasses and clovers, liming, topdressing, and judicious stocking.

[S. H. Saxby, photo.

BROWNTOP (*Agrostis tenuis*).—Until a few years ago browntop was regarded as the inevitable successor to ryegrass in permanent pastures on much of the poorer clay subsoil country in New Zealand. This type of country, with the seed that was then on the market, would hold a ryegrass pasture for some two years only, after which time it quickly reverted to a dominant browntop sward with, in some cases, a fair amount of dogstail and a little cocksfoot. Under these conditions browntop formed a rather low-producing but easily-managed pasture, especially if clover was in abundance. At the present time much of the country that is dominantly browntop is, with topdressing, giving good returns.

Although the fertility requirements of browntop are lower than those of ryegrass, the range of moisture requirement of these two grasses is much the same, browntop tolerating, on the whole, somewhat drier conditions than will ryegrass. On this account much of the ploughable country that is at present in browntop may, with topdressing and draining where necessary, be replaced with ryegrass-dominant swards.

Browntop is a slightly twitchy grass, and because of this will fairly rapidly form a dense sward. This character and its low fertility standard make browntop a very valuable grass on low fertility hill country that is not likely to be topdressed. Its value on this country is restricted only by soil moisture. When conditions are too dry, the browntop makes little headway, and is eventually replaced by the lower fertility and moisture demanding grass, danthonia (after bush burns).

This month's instalment of the series of articles on the grasses and clovers of New Zealand deals with grasses which thrive on soils of medium fertility and moisture content, and those which are found under conditions of low fertility and moisture. This section concludes the survey of grasses, and next month's article will deal with clovers.

Much of the second-class and one-time bush country was sown down in "English" grasses after the fallen bush was burnt. These grasses died out after a few years and left the way open for the ingress of weeds and secondary bush growth. If this country had been sown down with browntop dominating the mixture the secondary growth problem would not have been as great as it is now. The browntop would have thrived, with the result that the ingress of the weeds would have been less, and over a period of years the stock carried would have been greater.

Browntop alone, of course, would not have solved the problem of secondary growth, but its use would have assisted considerably. There occurs on the drier parts of the Canterbury Plains a form of browntop which is peculiar to this type of country. It has been named "dryland" browntop, and is possibly a form intermediate between redtop and browntop. As a hill country grass it is of little value, as its production and mat-forming habit are not as good as that of ordinary browntop. On the arable plains where it occurs it is regarded as a pest because of its very twitchy nature.

A Lawn Grass

On the whole, browntop is a useful grass for second-class hill country, but on second-class ploughable country it can, as a rule, be profitably replaced by a better sward of ryegrass and cocksfoot. Browntop, in conjunction with Chewings fescue, is the best lawn

grass for most situations because of its fine leaf and mat-forming habit.

Browntop may be differentiated from redtop and creeping bent by its very small ligule in contrast to the large ones of the other two. It has no ears, and the leaf shoot is rolled in the bud. The leaf, which tapers to a point, is usually of a dull green colour and is not shiny. On the upper surface of the leaf there are a number of prominent raised ribs.

Sweet Vernal (*Anthoxanthum odoratum*) is one of the commonest of the introduced grasses, and will grow on a wide range of soils, but is most prominent on the drier second- and third-class unploughable country, where it sometimes becomes almost the dominant grass. It is also prominent in run-out pastures on the drier arable country, where it is frequently associated with browntop.

Sweet vernal is a perennial plant, and was at one time included in hay mixtures in England in order to improve the flavour of the hay. When cured, sweet vernal certainly has an

Fig. 51.—On unploughable second-class country browntop is a valuable grass. In the foreground may be seen a patch of practically pure browntop which, besides producing useful feed, is competing strongly with the bidi-bidi. In the background the dominant grass is Yorkshire fog, which is being gradually replaced by bidi-bidi.

[*S. H. Saxby, photo.*

aromatic odour, but nevertheless has a bitter and unpleasant flavour. It is not eaten at all readily by stock when other feed is available.

On all ploughable country sweet vernal is a weed grass, and its presence in large amounts indicates a run-out pasture. On some of the hill country when growing in association with other poor grasses, such as fog, browntop, Chewings fescue, or tussock, it is eaten fairly readily and must be regarded as being of some value in producing "maintenance" feed.

Fig. 52.—**Sweet vernal is one of the commonest grasses on second-class country throughout New Zealand. It is also one of the first to commence flowering in the spring. Although nearly always regarded as a weed grass, it has some value on the poorer hill country which is not topdressed.**

[*S. H. Saxby, photo.*

The chief distinguishing character of sweet vernal is the presence of fairly long hairs round the base of the leaf. The ligule is fairly large and conspicuous. The leaf shoot is rolled, and ears are absent. The plant is variably hairy on the leaves and sheath.

Resistant to Drought

Tall Oat Grass (*Arrhenatherum elatius*) is a perennial grass which is grown to some extent in European countries, but which has not come into general use in New Zealand.

It has a wide habitat range, thriving on soils which vary considerably regarding moisture content, and, on account of its deep rooting system, will stand considerable periods of drought. It is quick and easy to establish, comes away early in the spring, and produces a fairly large amount of feed. These valuable features are, however, largely offset by its bitter taste. It is not relished by stock when anything better is available. Because of this it is of little value in a general mixture, where it would be neglected in favour of more palatable grasses.

Because of its drought resistance it has proved to be of great value on some of the higher elevation depleted country of Central Otago. Here it survives both the very dry summers and the very cold winters. On better-class soils there appears to be no justification for the sowing of tall oat grass, as better-producing and more attractive grasses may be grown.

Fig. 53.—**A panicle of tall oat grass. This grass thrives on a wide range of habitats, but is seldom sown because of its unpalatable nature.**

[*H. Drake, photo.*

The chief distinguishing character of tall oat grass is in the arrangement of the hairs on the leaf blades. These hairs run in distinct rows along the length of the leaf. The ligule is short, square cut, translucent, and has a ragged edge. Ears are absent.

Onion Rooted Twitch (*Arrhenatherum elatius, var. bulbosum*).—Botanically, this grass is very similar to tall oat grass, but differs in that it has creeping underground stems which develop bulbous swellings about the size of a pea. These swellings will break off the stems very readily and send out rootlets, thus causing the grass to spread rapidly. On this account it is a serious twitch on arable country.

It may be eradicated by the means adopted for the eradication of most

Fig.. 54.—**Snowgrass is one of the largest of the native tussock grasses, and is plentiful on much of the higher tussock country in the South Island.**

[*S. H. Saxby, photo.*

twitches, that is, by the use of smother crops. A minimum of surface working should be carried out, as this merely serves to distribute the broken-off swellings, which are too small to be gathered together by harrows for burning.

GRASSES WHICH THRIVE ON THIRD-CLASS SOILS OF LOW FERTILITY AND MOISTURE CONTENT.

Danthonia.—This name is usually applied without discrimination to several species of this genus. On the whole, *Danthonia pilosa* is the best because of its superior turf-forming habit and its greater palatability. The habitat of danthonia is one of drier and poorer conditions than that of browntop, and will grow where practically no other grass will exist. Under these conditions it is much better than browntop, which becomes poor, stunted, and sod-bound. For the same reasons it is better than Chewings fescue.

Slow to Establish

Danthonia is a fine-leafed and dense plant which increases by means of short, underground tillers and, when occurring in any quantity, forms a valuable dense and permanent cover. It is very slow to establish, and on this account should be sown in conjunction with some of the quicker-maturing but shorter-lived grasses which will assist in the suppression of weed growth in the early stages.

On account of its ability to withstand burning, danthonia is a valuable grass on hill country which tends to revert to secondary growth. If spelled for a season the danthonia will produce sufficient herbage to carry a good fire which will not only assist in the destruction of the secondary growth but will also encourage the danthonia. Repeated burning will eventually lead to its complete dominance.

Fig. 55.—Silver tussock was the dominant tussock on much of the higher rainfall parts of the tussock country of the South Island. At the present time much of the former silver tussock country is in good pasture. The remaining silver tussock country is, on the whole, not easily ploughed, where, however, it is being replaced to a large extent by plants such as browntop, Yorkshire fog, sweet vernal and clover. The illustration shows these two phases of the silver tussock country.

[*S. H. Saxby, photo.*

Fig. 56.—The dominant grass on large areas of the drier tussock lands is the hard tussock. It is neglected by stock. Here can be seen plants of hard tussock which have been entirely neglected by both sheep and rabbits. The closely grazed tussock are those of the palatable little blue tussock.

[*S. H. Saxby, photo.*

On poor hill country danthonia represents the ultimate and best plant covering that can be obtained without topdressing. On ploughable country it is of no value, as this country can be economically topdressed and maintained in a higher state of production with better grasses. When it does occur on this country it should be regarded as an indication that the pasture is as poor as it can become and that ploughing and resowing are necessary.

The various danthonia species may be distinguished from other grasses by the fine leaves and the rather hairy nature of the plants. The most characteristic feature is the presence of long hairs at the base of the blade.

Snow Grass (*Danthonia flavescens*).—As its name implies, this native tussock grass occurs chiefly on country of high altitude which is under snow for part of the year. In the southern part of the South Island it is to be found on much lower levels. It is an

Fig. 57.—Panicles of the erect and better form of blue wheat grass. [*H. Drake, photo.*

erect-growing, tussocky grass, growing up to 3 feet in height and, in some parts of the natural grassland, was the dominant plant.

Danger of Burning

As a pasture grass on this country it is quite a valuable component of the grassland, both because of its sheltering nature and the feed it produces. Sheep do not eat the rank and fully-grown plant to any extent, but relish the young growth coming away after it has been burnt off, at which time it produces a considerable amount of feed. Snow grass is one of the easiest of the native grasses to destroy by indiscriminate burning, and there is no doubt that this has been responsible for a considerable decrease of this grass in much of the tussock country.

Blue Tussock (*Poa Colensoi and Poa intermedia*).—These two very similar grasses, which differ only in that the latter is considerably the larger grass, are some of the most palatable and

Fig. 58.—Left, English hairgrass; right, ordinary hairgrass. Both of these annual plants are inhabitants of poor, dry soils. The amount of feed produced by either is very small. [*H. Drake, photo.*

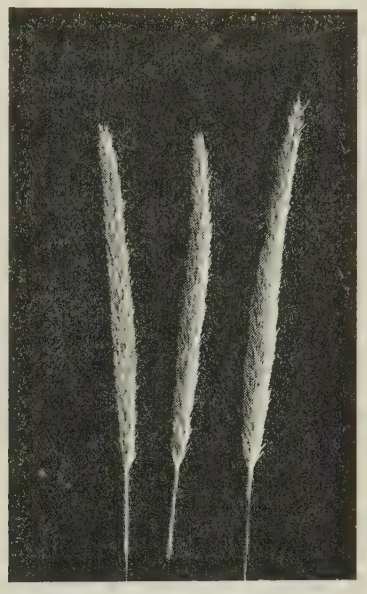

Fig. 59.—Seed heads of marram grass, the most valuable of the sand-binding grasses.

useful of the native tussock grasses. They are bushy perennial grasses of a distinct bluish green colour, and occur in tussock country as far north as Lake Taupo. Blue tussock, in addition to being so palatable, has the advantage of withstanding burning fairly well, although continuous burning will destroy it, as will continuous and close grazing. One of the biggest problems in the maintenance of our tussock country appears to be wrapped up in the maintenance and encouragement of blue tussock, together with danthonia and blue wheat grass. The sowing of exotic grasses has, up to the present, not met with success, possibly due to the fact that poor seed of high fertility demanding grasses have been sown.

Silver Tussock (*Poa caespitosa*) is one of the dominant tussock grasses on country of medium rainfall or fairly high moisture content. It is one of the least palatable of the tussock grasses, and is rarely eaten by sheep except after burning or when no other feed is available. From the pastoral point of view it is of little value except for its quality of providing shelter for something better to grow in.

Low Fertility Grass

Chewings Fescue (*Festuca rubra, var. fallax*) is a variety of the European hard fescue, and was selected and introduced into New Zealand commerce about 1880. This is a fine-leafed, somewhat twitchy and low-producing

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grass which will grow on soils of low fertility which dry out badly in the summer.

Although this grass was sown out to a considerable extent after its introduction, it is now seldom sown for pastures because of its many disadvantages and few advantages.

Its only good point is that it will in time make a complete cover, and on this account is of some use on the very poorest country, such as shingle plains and exposed hill faces of low fertility and very dry.

Its disadvantages are that it is not quick to establish from seed, that it is low-producing except when amply supplied with nitrogen, and that as soon as it forms a complete ground cover it makes a dense, sod-bound mat which is low in production and almost impervious to water. When it reaches this stage on ploughable country it is necessary for the sod to be broken by ploughing in a narrow furrow.

On the whole, Chewings fescue should never be sown on country that is good enough to grow browntop, which is a much better grass. *Danthonia pilosa* is to be preferred to Chewings fescue, as, although slower to establish, the former does not become sod-bound. The only district in New Zealand where the growing of Chewings fescue is being carried out extensively is on the Lumsden-Mossburn plains in Southland, where seed production is practised. As a lawn grass in conjunction with browntop, Chewings fescue has no equal, as it makes a dense, hard-wearing turf of good appearance and playing qualities.

The characteristic feature of Chewings fescue is in its ears, which are not as clasping or as prominent as in many other grasses, but are short, stiff, and erect. The leaf blade is very narrow, and usually rolled along the whole of its length. The ligule is very small.

More Native Grasses

Hard Tussock (*Festuca Nova Zealandeae*).—Together with silver tussock, this is one of the dominant grasses on low tussock country. Its climatic range is, however, considerably wider than that of silver tussock, and it will grow under much drier conditions. In value it is very similar to silver tussock in that stock will eat it only after a burn or when they are hard-pressed for feed. On ploughable country it can be replaced by better grasses according to the conditions under which it is growing.

Fig. 60.—**Ratstail is a deep-rooted, somewhat tussocky perennial grass, and thrives in loose soils in the warmer parts of the country.**

[*S. H. Saxby, photo.*

Blue Wheat Grass (*Agropyron scabrum*).—This grass occurs as a native in several forms, varying from an erect-growing tussock plant to a prostrate trailing plant.

It is generally regarded as being one of the best of the native grasses on unploughable tussock country, and every encouragement should be given to the maintenance of it here.

Being so palatable, it has been eaten out in many districts where it has been heavily stocked. Blue wheat grass provides a large amount of feed, and sheep do very well on pastures containing much of it.

Ratstail (*Sporobolus capensis*).—This is a tussocky, harsh-leafed perennial grass that has much the same climatic range as *paspalum dilatatum*, that is, it will thrive in districts that do not experience long periods of intense cold. Its soil fertility requirements are very similar to those of *Danthonia pilosa*. Hence, it reaches its maximum development in loose poor soils in warm districts.

Because of its deep root system, ratstail will stand prolonged periods of drought.

Opinions regarding its value vary considerably, and depend not so much on the grass itself as on the way in which it is managed. When mature, the leaves of rats-tail are harsh and unattractive, so harsh that it is very hard on sheep's teeth. When kept in a short condition by cattle it produces a fair amount of quite useful sheep feed which is eaten quite readily.

Fertility Indicators

Hairgrass (*Vulpia bromoids and V. myuros*).—This is another of our annual weed grasses, and is common on most light and dry soils throughout the country. As it thrives on poor country and open swards it is seldom seen in good pastures on heavy land.

As a pasture grass it is practically worthless because of its very low production and short season of growth. The dominance of hairgrass in ploughable paddocks indicates that the ploughing of the pasture is overdue.

The control of hairgrass in pastures is largely a matter of raising the soil fertility to a level where better grasses and clovers will thrive. In much of the typical hairgrass country the introduction of subterranean clover and consequent improvement of fertility

has resulted in the hairgrass being smothered out to a great extent by more vigorous and more useful grasses and clovers.

English Hairgrass (*Aira caryophyllea*).—A very common annual grass requiring very low conditions of fertility. It is common throughout most of the tussock country, and is prominent on run-out pastures or shingle plains in association with haresfoot trefoil and ordinary hairgrass.

It starts growth early in the spring, and after having produced a small amount of feed goes to seed early in the summer and dies. On ploughable country it indicates a very poor run-out pasture, and on tussock country it does no harm and very little good.

Fig. 61.—**The main value of any sand-binding plant is its ability not only to compete with, but also to arrest the ever-moving sand. Here, silvery sand grass is seen growing strongly on a sand dune.**

[*S. H. Saxby, photo.*

GRASSES THAT THRIVE ON LOOSE OR CONSOLIDATED SAND COUNTRY.

Marram Grass (*Amnophila arenaria*).—Tall-growing, erect, coarse, and twitchy, this grass has been found ideal, not as a pasture grass, but as the primary step in the vegetating of drifting sand country. The first stage in bringing in sand country is that of finding a plant which will not only thrive in drifting sand, which continually covers it up, but which will grow so rapidly that it will actually act as a check on the moving sand. Marram grass has been found to be the most suitable for this. Silvery sand grass (*spinifex hirsutus*) and pingao (*Scirpus frondosus*) are also useful in this respect, but are not as satisfactory as marram grass.

Marram grass is usually associated with coastal sand reclamation, but is equally valuable in the stabilisation of inland sand drifts. The main factors to be observed in the planting of marram grass are as follows:—

(1) Use plants that are not more than two years of age.

(2) Plant about 8 in. deep in rows from 2 ft. to 3 ft. apart.

(3) Each plant should have several stems, which should have at least two rooted joints.

(4) Plant in wet weather, if possible, to ensure a strike and to prevent smothering with sand before establishment is complete.

Indian Djoob (*Cynodon dactylon*) is also called Bermuda grass, and requires loose sandy conditions and a warm climate in which to thrive. It is very twitchy and is a weed plant on arable land, but is of some value both as a feed-producer and as a maintainer of a firm sward on consolidated sand country. Being deep rooted, it will stand considerable periods of drought, although its leaf production is then very low.

(*To be continued.*)

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Cool Storage of Fruit

Orchard Storage As Means Of Holding Surplus Supplies

A. POWELL, Cool Storage Officer, Wellington.

ALTHOUGH there are prospects of a heavy crop of fruit being harvested in the coming season, reduced quantities of fruit are likely to be exported, and insufficient cool storage space will be available to meet requirements. It may, therefore, be necessary for fruit-growers to turn their attention to holding of much of their fruit in orchard storage during the coming fruit season.

If circumstances should prevent the export of fruit there will be an increase of approximately 1½ million cases to be marketed within the Dominion. To assist with the orderly distribution of the fruit, suitable orchard stores will need to be provided by each grower as an inexpensive means of holding much of his fruit in order to spread delivery and to avoid glutting the markets during the harvesting period.

It will be advisable for the owners of all refrigerated cool stores to have a thorough overhaul of their refrigerators and other plant carried out in advance, as in all probability during the coming fruit season the fruit cool storage plants will be kept running continuously over an extended period.

In some of the fruit cool stores sufficient plant has been installed to carry an increase in the storage space, and it is desirable in the case of those insufficiently equipped that the increase should be proceeded with, provided the necessary insulating material and piping are available when required.

There are also several insulated chambers in use for orchard storage. It would be of great assistance to the marketing organisation if the owners could install refrigerating equipment in these chambers to meet the possible heavy demand for refrigerated cool storage space.

Orchard Storage

There are several means for obtaining a reduction of the temperature and

One of the effects of the war on fruit-growers is likely to be a heavy demand for refrigerated cool storage space, and it may be necessary for fruit-growers to hold much of their fruit for a time in orchard storage during this season. Three systems for this form of storage are described in this article.

of maintaining an even temperature in orchard storage chambers.

The use of the air circulation provided by the prevailing winds, together with the distribution of cooling water to reduce the air temperature and to maintain humidity conditions in the chamber to avoid excessive wilting, should be beneficial for temporary storage.

Much could be achieved in maintaining the condition of fruit while in this class of storage if a closer study were made of the factors which affect the fruit under the conditions encountered in orchard storage.

Artesian or spring water, if available, may be used with advantage to maintain a moist condition on the roof and also to keep the material which forms the side of the stacks in moist condition, as this is most important in avoiding excessive wilting of the fruit. Moisture is taken up by the air passing through the moistened material which forms the sides, and the humidity of the atmosphere which comes in contact with the fruit is constantly maintained.

A thorough distribution of moisture is most important in obtaining satisfactory results. Good drainage should be provided all round the stacks of fruit.

Spray System

The use of artesian water and cool night air as cooling agents should be of great assistance when means of using these cooling agents are installed, so that the maximum cooling may be obtained and distributed evenly among the fruit cases by a positive air cooling system. One method consists of a spray system for cooling the atmosphere of an orchard storage chamber. The air is drawn from the chamber by a fan and forced through the spray room, where the temperature is reduced by the cool artesian water, which is more effective for cooling when sprayed in the form of a fine mist. It is possible by using this method to reduce the temperature of the air to within a few degrees of the water temperature, which is generally found to be from 53 degrees to 55 degrees Fahrenheit.

Fig. 1 shows a cooling safe for the cooling of foodstuffs. This form of cooling from water is very effective in warm climates. The cooling effect of the reservoir of water covering the whole top of the safe is important, as well as that derived from the water constantly syphoning through the loosely-woven material which is fixed on all four sides of the safe. The reservoir under the safe also assists in the cooling. This is an effective method for holding all classes of perishable foodstuffs, and can be recommended as suitable for orchard fruit storage.

Useful Method

The distribution of the cooling water over these surfaces also permits air to circulate through the loosely-woven material, thus coming in contact with the cooling water and increasing humidity. This method of obtaining a reduction in temperature is well worthy of closer study by those endeavouring to devise a cheap and effective method for cooling fruit in temporary storage under emergency conditions, and could be applied to the orchard storage of fruit.

A description of this comparatively cheap method which could be applied

to the holding of fruit in orchard storage should be useful to orchardists who have artesian or spring water available for cooling, as from these suggestions fruit storage accommodation in the orchard may be constructed which would give improved results compared with the ordinary orchard storage.

In many fruit-growing areas either spring or artesian water is available at temperatures ranging from 54 degrees to 58 degrees Fahrenheit. This water, if distributed over perforated surfaces around stacks of fruit cases, will serve a double purpose by reducing the temperature of the stacked fruit and increasing the moisture-content of the atmosphere, which is circulated by the air movement throughout the stacks. When dunnage is used to open up the stacks further, it should be placed in the direction of the prevailing winds.

Material Needed

The material required for this form of storage is as follows:

(1) Timber for shed construction and also for dunnage under the fruit stacks.

(2) Sheets of galvanised corrugated iron to form a roof over the fruit stack.

(3) Scrim to form the sides of the stack and to distribute the water for raising the humidity of the air circulating among the stacks of cases.

Suitable scrim may be procured in rolls of 50 yards and in 6ft. widths. The price ranges from 9¾d. to 11¼d. per lineal yard, according to quality.

In Fig. 2 the water is run into shallow trays or on sheets of galvanised iron, which should be placed in the storage chamber in order to form a false ceiling, leaving 2ft. of space between it and the ceiling of the chamber. Each sheet of iron should be spaced so that 18in. are left between each for convectional air movement. The sheets of iron forming the false ceiling should be given a slight fall or inclination towards a length of spouting fixed to the chamber wall for draining away the water, which is pumped from an artesian supply or run from a spring and evenly distributed over the sheets of iron at the end furthest from the drain.

The effect of the water on the iron, and also the assistance of air circulation over the top of the false ceiling provided for by the installation of an air circulating fan, which may also be used for the purpose of introducing cool night air into the cooling chamber, should maintain an even temperature in the chamber.

In some fruit-growing areas storage sheds have been erected over a running stream of water. The floors of these sheds are lowered in order to direct the air movement from the running water up through the fruit stacks, and ventilation is placed in the roof of the shed to provide for an upward air movement. Although good results are obtainable when these sheds are erected in cool, shady positions, better cooling and humidity conditions could be obtained if the cool water were distributed above and around the stacks, as shown in Fig. 2.

Any system other than refrigerated storage cannot be thoroughly satisfactory for holding fruit. Therefore, it is not advisable to expend too much capital on such forms of storage.

Suggestions

The following suggestions may be helpful to orchardists during the coming season:—

(1) Fruit should be harvested when mature, and should immediately be placed in the orchard store.

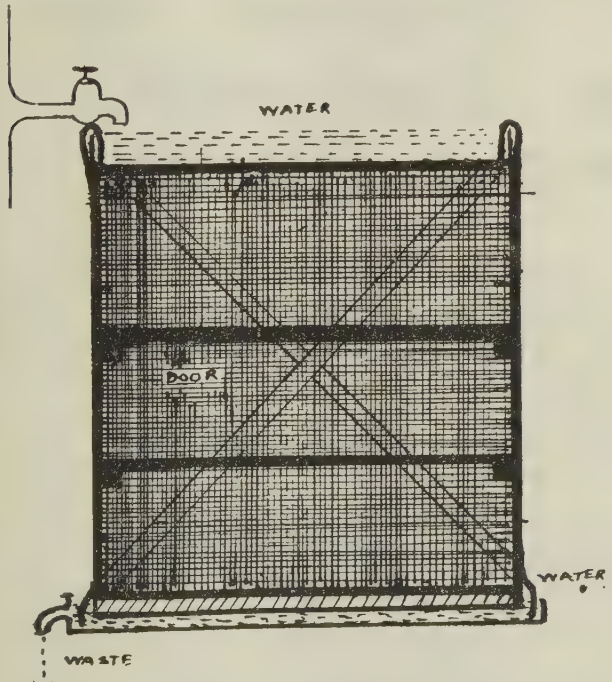

Fig. 1.—A sketch showing the method of effectively cooling a meat safe with the use of dripping water, and the siphoning of the water from the top of the safe down through the cloth which forms the sides of the safe and into the bottom receptacle.

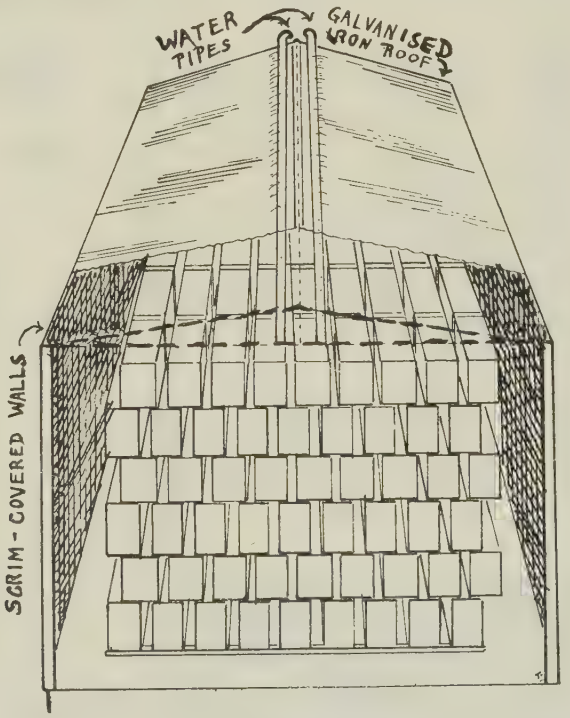

Fig. 2.—The same principle applied to a large shed. Note the staggering of the cases to allow the passage of cool air.

(2) Before filling the cases with fruit, line them with newspaper.

(3) Pine plantation, macrocarpa hedges, or other shelter or wind breaks are very often found to be suitable for orchard storage.

(4) Place timber under the cases as dunnage to protect the case and to provide for air movement under the stacks.

(5) When stacking fruit cases, leave open spaces to provide for a good air circulation around each tier of cases. Throughout the stacks two or three inches between each tier of cases is recommended.

(6) Cover the top of the stack with galvanised iron, and place old sacks, straw, grass, or scrub on top of the iron to hold moisture and give added cooling effect.

(7) The stack should not be more than eight cases wide, but may be as long as required. The long sides should face in the direction of prevailing winds.

(8) Give the roofing iron an inclination from the centre of the stack to both sides and a hang-over of about one foot or more on each side of the stack.

(9) Place scrim on the edge of the galvanised iron roof and fasten the bottom of the scrim to the ground. This will allow water from the roof to be distributed over the scrim on the sides, thus increasing the humidity of the air as it passes through the scrim forming the sides. If scrim is not available brush may be used for the sides (both would be advantageous).

Purchase of Lucerne Seed

WHEN lucerne seed is being bought from retailers, possibly even a little more care should be exercised in the purchase of this seed than with certain other seeds. The reason for this is that lucerne seed moves slowly on the markets, and small retailers are liable to hold supplies over long periods, during which time deterioration occurs. Then, again, seasons of scarcity are followed by production well in excess of requirements, and large bulk stocks may be held for some years.

Fresh seed of high germination should be plump and bright yellow in colour. Seed with a proportion of brown or tan coloured seed should be avoided, as this "off" colour indicates deterioration through age.

Newly-harvested lucerne seed may contain a high proportion of hard seeds, that is, living seeds impermeable to moisture, which may lie in soil for long periods of months or even years before they naturally soften and germinate.

Lucerne seed imported into New Zealand, mainly from South Africa and occasionally Australia, is specially differentiated from New Zealand Marlborough-grown by the presence of 10 per cent. of seed stained red.

As the success of the subsequent stand, especially in competition with weeds, depends to no small degree on vigorous seedling establishment, it is essential that only seed of highest purity and germination be used, and buyers should, in all cases, base their seed selection, not on price, but on test percentages of not less than 98 per cent. purity and 90 per cent. germination tests, which should have been made not more than six months previously.

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Name of Cow and Class	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season:		
				Days	Milk	Fat
		Yrs. Dys.	lb.		lb.	lb.
Junior Two-year-old						
Premier Royal Queen	W. Dunn & Sons, Waihou	1 336	275.5	365	11,823.4	601.34
Maple Princess	J. H. Sherrard, Otaua, Waiuku	1 349	275.5	336	9,609.4	545.63
Maple Jewel Queen	J. H. Sherrard, Otaua, Waiuku	2 9	276.4	349	9,394.5	541.87
Maple Day Leaf	J. H. Sherrard, Otaua, Waiuku	2 9	276.4	350	8,274.9	534.30
Mamakura Queenie	K. I'Anson, Te Puna	1 292	275.5	365	8,967.1	523.80
Mamakura Trixie	K. I'Anson, Te Puna	2 2	275.7	365	9,281.0	520.36
Kenilworth Melva	C. W. N. Rowe, Rowan, Stratford	2 36	279.1	343	8,227.3	507.08
Oakvale Molly	J. H. Street, Bell Block	2 62	281.7	365	7,037.2	493.05
Almadale Perfect Lady	E. A. Alexander & L. J. Schrader, Pakuranga	1 355	275.5	365	8,003.5	477.12
Shelford Nightcap	A. G. Melrose, Walton	2 11	276.6	365	7,733.2	476.37
Shelford Promise	A. G. Melrose, Walton	1 336	275.5	365	7,747.4	473.77
Glenara Excel	A. G. Colson, Bell Block	2 22	277.7	365	7,245.5	469.81
Mamakura Alice	K. I'Anson, Te Puna	1 335	275.5	365	7,634.7	469.56
Agley Amber Glow	W. L. Carter, Shannon	2 71	282.6	363	9,120.7	461.94
Manakoa Margaret Rose	A. H. Wright, Waiuku	1 338	275.5	365	7,415.1	461.47
Shelford Patsy	A. G. Melrose, Walton	1 355	275.5	365	7,098.1	451.08
Tuhitarata Dusky Lass	J. Jameson, Featherston	2 22	277.9	365	7,522.4	447.39
Stirling Daisy	J. A. Moffat, Dargaville	2 86	284.1	365	7,800.9	446.53
Sheffield Golden Prim	L. D. Adams, Sheffield	2 87	284.2	305	7,929.2	436.26
Lyn Jasmine	A. J. Mace, Rototuna, Hamilton	1 364	275.5	365	7,693.3	431.71
Premier Margaret Rose	W. Dunn & Sons, Waihou	1 360	275.5	365	7,611.4	430.58
Sandridge Astrid	J. Alex. Pettigrew, Pihama	1 332	275.5	365	7,664.4	426.91
Ashvale Oxford Treasure	T. H. Gooch, Huinga	1 321	275.5	365	7,133.8	424.17
Tuhitarata Annette	J. Jameson, Featherston	2 9	276.4	365	7,525.1	421.47
Pinecrest Golden Cream	E. J. Clough, Inglewood	2 37	279.2	365	7,287.1	421.19
Sandridge Silkie	J. Alex. Pettigrew, Pihama	1 312	275.5	365	7,397.4	419.40
Rosedell Ina	T. H. Gooch, Huinga	1 341	275.5	364	6,892.4	419.32
Lyn Teresa	A. J. Mace, Rototuna, Hamilton	1 332	275.5	365	7,931.2	415.34
Crystal Springs Merle	W. L. Carter, Shannon	2 17	277.2	365	7,203.8	412.55
Kelvin Gay Lady	G. Buchanan, Paeroa	2 45	280.0	365	6,869.3	410.68
Wattles Perfection	F. C. Ross, Feilding	1 342	275.5	365	7,314.8	407.37
Jerseydale Talent	J. Pettigrew, Pihama	1 345	275.5	365	7,738.2	394.99
Stanton Fairy Bell	H. E. Johnson & Co., Whangarei	2 5	276.0	358	5,769.7	353.70
Pa View Cherry	W. H. Gordon, Greytown	2 48	280.3	251	5,499.7	353.65
Stanton Sweet Briar	H. E. Johnson & Co., Whangarei	2 16	277.1	365	5,632.1	344.60
Mountain Meadows Jewel	F. V. Green, Waitara	2 81	283.6	310	6,286.9	342.85
Jerseydale Maytime	J. Pettigrew, Pihama	2 13	276.8	361	5,625.9	339.21
Stanton Fairy Ribbon	H. E. Johnson & Co., Whangarei	2 5	276.0	365	5,898.7	338.76
Marlowe Margaret Rose	E. Hofmann, Kati Kati	1 224	275.5	346	5,902.2	336.44
Stanton Day Dream	H. E. Johnson & Co., Whangarei	2 21	277.6	347	5,328.7	317.74
Senior Two-year-old						
Hatcliffe Josephine	P. A. Anderson, Levin	2 324	307.9	365	11,261.7	703.54
Hatcliffe Leonie	P. A. Anderson, Levin	2 337	309.2	365	10,706.5	698.52
Peveril Sensation	A. Hudson, Levin	2 364	311.9	365	11,620.8	634.28
Peveril Lucky	A. Hudson, Levin	2 340	309.5	364	11,482.4	604.52
Punga Nui Madam Butterfly	D. Yandle, Te Wera	2 305	306.0	365	11,310.0	592.55
Tararua Diamond Ring	Jas. Pullar & Sons, Winton	2 312	306.7	344	10,205.4	521.15
Heatherlea Rona	A. J. Mace, Rototuna, Hamilton	2 151	290.6	365	10,864.8	520.51
Pinecrest Favourite	E. J. Clough, Inglewood	2 344	309.9	365	7,534.8	485.26
Manakoa Lady	A. H. Wright, Waiuku	2 340	309.5	365	8,152.8	467.20
Premier Sirius	W. Dunn & Sons, Waihou	2 177	293.2	365	8,147.4	449.03
Tuhitarata Eve	J. Jameson, Featherston	2 340	309.5	365	8,608.3	443.56
Yorkshire Grange Vina	K. I'Anson, Te Puna	2 343	309.8	365	7,640.8	439.27
Ivondale Peaceful	Miss E. I. S. Piper, Awapuni	2 330	308.5	365	7,793.6	433.65
Santa Rosa Rosebud	Alexander & Schrader, Pakuranga	2 363	311.8	365	7,863.3	421.03
Hilly Glen Prue	R. & J. Strugnell, Tauranga	2 315	307.0	308	6,467.4	351.63
Ivondale Lady Bamford	Miss E. I. S. Piper, Awapuni	2 278	303.3	365	5,788.2	305.08
Three-year-old						
Stirling Blonde	J. A. Moffat, Dargaville	3 352	347.2	365	13,461.8	725.42
Greenmeadows Ladylike	Mdm. M. J. de Guise Rousse, Mangere	3 267	338.7	365	12,340.8	626.24
Pinewoods Standard Sue	A. H. Wright, Waiuku	3 297	341.7	365	10,637.1	614.72
Lancewood Dainty Lady	B. R. Robinson, Manakau	3 327	344.7	365	9,744.8	609.99
Glenmore Gipsy Maid	L. John, Glen Dwr, Ngaere	3 30	315.0	364	8,966.4	583.70
Reketi Sultana	J. E. Laing, Te Hoe	3 70	319.0	364	9,465.6	578.73
Tuhitarata Aurelia	J. Jameson, Featherston	3 334	345.4	365	10,219.4	569.37
Strandon Ena	**J. F. Young, Jnr., Inglewood**	3 351	347.1	365	8,739.9	550.50
Caledonia Ardent	W. P. Begg, Arapohue, Dargaville	3 272	339.2	365	9,257.0	542.76
Caledonia Fultide	W. P. Begg, Arapohue, Dargaville	3 354	347.4	365	9,173.9	541.75
Brookdell Elizabeth	J. C. Colson (for Est. J. R. Colson) Waihou	3 363	348.3	365	9,149.0	516.08

Jerseys (Continued).

Name of Cow and Class	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season:		
				Days	Milk	Fat
Hua Brook Estella	Hamlin Bros., Rongotea	3 354	347.4	365	8,341.8	495.59
Brookdell Bonny Raindrop	J. C. Colson (for Est. J. R. Colson) Waihou	3 310	343.0	365	8,459.7	495.29
Manawatu Twinkle	B. R. Robinson, Manakau	3 200	332.0	300	9,035.0	494.72
Stanton Golden Jean	H. E. Johnson & Co., Whangarei	3 271	339.1	347	8,813.3	482.60
Tararua Marguerite	P. A. Anderson, Levin	3 308	342.8	338	10,013.6	479.65
Mountain Meadows Miss Ivy	F. V. Green, Waitara	3 275	339.5	338	8,471.7	463.14
Wainoni Glaxo Girl	R. C. Powell, Palmerston North	3 342	346.2	341	8,609.5	450.50
Wattles Wish	F. C. Ross, Feilding	3 351	347.1	365	8,148.7	447.59
Sandridge Brownie	J. Alex. Pettigrew, Pihama	3 347	346.7	335	8,151.6	437.69
Tauwhare Caramel	A. J. Arthur, Morrinsville	3 89	320.9	365	7,310.7	437.18
Strandon Flush	J. F. Young, Jnr., Inglewood	3 64	318.4	311	7,886.5	430.02
Ebors African	R. J. Wilson, Putaruru	3 —	312.0	244	7,569.6	425.83
Tararua Silver Wave	Jas. Pullar & Sons, Winton	3 17	313.7	290	7,056.3	422.95
Taioma Golden Dawn	J. A. Meharry, Tauranga	3 315	343.5	365	7,224.3	402.06
Pinewoods Sybil's Gem	Hamlin Bros., Rongotea	3 47	316.7	345	7,360.2	401.44
Tuhitarata Adeline	J. Jameson, Featherston	3 323	344.3	365	8,432.6	399.33
Four-year-old						
Glenmore Sapphire	A. C. Smith, Tauranga	4 358	384.3	365	11,696.0	667.61
Glenmore Primrose	L. John, Glen Dwr, Ngaere	4 15	350.0	364	10,277.6	617.19
Wattles Sparkle	F. C. Ross, Feilding	4 11	349.6	365	9,801.6	583.16
Lancewood Ripple	B. R. Robinson, Manakau	4 19	350.4	365	10,740.1	561.89
Pretty Jewel	Hamlin Bros., Rongotea	4 330	345.0	365	9,392.5	524.59
Wainoni Lady Lucy	R. C. Powell, Palmerston North	4 23	350.8	365	9,357.8	511.62
Manakoa Golden Lass	A. H. Wright, Waiuku	4 360	384.5	365	9,577.2	505.28
Wattles Gift	F. C. Ross, Feilding	4 346	383.1	328	8,355.2	504.16
Cranbrook Winsome	E. Hofmann, Kati Kati	4 138	362.3	365	9,877.6	500.75
Silverleys Margaret	C. W. N. Rowe, Rowan, Stratford	4 34	351.9	365	8,889.8	499.29
Fairlands Felicia	J. Klenner, Kaimata	4 68	355.3	296	9,189.4	497.12
Stirling Pam	J. A. Moffat, Dargaville	4 328	381.3	365	8,857.2	484.15
Wairoa Pretty's Flirt	L. D. Adams, Sheffield, Canterbury	4 30	351.5	265	9,094.3	462.90
Vailoa Golden Gift	Mdm. M. J. de Guise Roussel, Mangere	4 16	350.1	314	7,768.4	412.79
Mature						
Lucky Lassie	J. P. Revell, Pukekohe	6 306	385.0	365	14,407.0	845.63
Mountain Meadows Elf	A. G. Colson, Bell Block	7 26	385.0	365	10,927.7	764.55
Sunridge Wavelet	A. C. Smith, Tauranga	9 9	385.0	365	11,710.8	723.78
Pretty Plume	J. P. Revell, Pukekohe	7 1	385.0	365	11,237.2	707.73
Hatcliffe Gaiety Girl	M. Maras, Maungaturoto Railway	5 297	385.0	365	11,798.2	672.78
Ebors Althea	Mdm. M. J. de Guise Roussel, Mangere	5 5	385.0	365	11,298.9	638.61
Oakvale Florence	J. H. Street, Bell Block	6 26	385.0	365	10,575.6	634.25
Oakvale Melba	J. H. Street, Bell Block	5 340	385.0	365	9,902.3	628.71
Peveril Charm	A. Hudson, Levin	9 76	385.0	365	12,925.9	625.76
Rosemont Chimes	J. P. Revell, Pukekohe	12 299	385.0	365	12,602.9	624.02
Te Keteroa Pansy	A. H. Burwell, Kaimata	6 292	385.0	365	10,609.7	619.05
Peveril Daisy	A. Hudson, Levin	7 291	385.0	365	14,414.9	618.63
Caledonia Flossie	W. P. Begg, Arapohue, Dargaville	5 284	385.0	365	10,111.7	610.56
Caledonia Blossom	W. P. Begg, Arapohue, Dargaville	6 15	385.0	365	10,352.7	607.34
Caledonia Lucky	W. P. Begg, Arapohue, Dargaville	5 13	385.0	365	10,130.7	599.61
Huia Juno	H. G. Lever, Otomoetai	7 38	385.0	365	10,790.1	591.78
Lancewood Jean	B. R. Robinson, Manakau	5 28	385.0	349	11,036.7	591.24
Silverleys Peggy	A. G. Colson, Bell Block	5 36	385.0	345	11,083.8	588.21
Pinewoods Sybil's Dinah	Mdm. M. J. de Guise Roussel, Mangere	5 6	385.0	365	11,430.8	588.19
Royton Fawn Fairy	J. H. Sherrard, Otaua, Waiuku	7 357	385.0	353	11,391.1	573.90
Super Chrysanthemum	H. R. Baker, Turua, Hauraki Plains	8 362	385.0	347	9,740.1	551.37
Strandon Beauty	J. F. Young, Jnr., Inglewood	6 315	385.0	365	9,454.4	545.59
Melvin Meg	K. G. Poulgrain, Manutuke, Gisborne	7 352	385.0	364	9,001.5	542.69
Winsford Heather Bells	J. E. Laing, Te Hoe	8 347	385.0	364	8,154.4	538.42
Restholme Sunshine	W. J. Chynoweth, Walton, Waikato	5 294	385.0	365	8,741.3	529.77
Lancewood Betty	B. R. Robinson, Manakau	6 148	385.0	365	9,616.8	523.93
Jersey Meadows Topaz	H. J. Lancaster, Glen Oroua	8 28	385.0	329	8,968.1	516.66
Wendouree Empress	Mrs. J. Milligan, Little River, Canterbury	5 29	385.0	365	9,266.2	514.83
Oakvale Madcap	J. H. Street, Bell Block	5 77	385.0	365	8,839.5	492.48
Woodlands Lorna	F. V. Green, Waitara	7 119	385.0	313	8,617.6	487.40
Brookdell Pal O'Mine	J. C. Colson (for Est. J. R. Colson) Waihou	5 296	385.0	365	8,328.8	486.85
Woodlands Petrova	W. L. Carter, Shannon	5 6	385.0	344	7,657.3	463.31
Fairwood Rosette	C. W. A. Osborne, Bulls	5 98	385.0	365	7,579.1	456.73
Fairwood Moonshine	C. W. A. Osborne, Bulls	5 5	385.0	365	8,169.9	455.42
Wellfield Pet Girl	A. J. Arthur, Morrinsville	7 298	385.0	298	6,807.8	450.27
Marshlands Sunshine	W. J. Chynoweth, Walton, Waikato	11 346	385.0	365	7,879.6	445.17
Frankleigh Favourite	W. H. Smith, Dannevirke	5 349	385.0	319	8,651.4	444.71
Rosevale Lucy	Mdm. M. J. de Guise Roussel, Mangere	11 23	385.0	324	9,328.6	441.54
Fairlands Goldie	J. Klenner, Kaimata	5 39	385.0	286	7,871.6	432.06
O.K. Baby Clemora	Mdm. M. J. de Guise Roussel, Mangere	7 314	385.0	307	9,843.1	429.89
Hurden New Issue	Mdm. M. J. de Guise Roussel, Mangere	11 4	385.0	365	7,836.3	425.98
Wellfield Dream	A. J. Arthur, Morrinsville	7 354	385.0	305	7,169.9	420.92
Fairwood Moonlight	C. W. A. Osborne, Bulls	6 354	385.0	365	8,282.6	420.73
Silverleys May	W. L. Carter, Shannon	5 41	385.0	331	6,605.6	399.93
Brookdell Queenie	J. C. Colson (for Est. J. R. Colson) Waihou	7 38	385.0	297	6,796.5	389.40
Fern Dell Glory	W. L. Carter, Shannon	8 321	385.0	325	6,591.3	388.58

Friesians.

Junior Two-year-old						
Lauderdale Princess Lorraine	R. H. Dickie, Mataura	1 355	275.5	359	10,501.4	342.13
Junior Three-year-old						
Bushlea Peach	Smart & Son, Tikorangi	3 56	317.6	321	13,877.4	550.22

Friesians (Continued).

Name of Cow and Class	Tested by	Age at Start of Test.	Fat required for Certificate.	Yield for Season: Days	Milk	Fat
Senior Four-year-old						
Lauderdale Sylvia Lilac	R. H. Dickie, Mataura	4 340	382.5	365	19,152.9	671.09
Ahikouka Fobes Perfection	K. G. Fairbrother, Dalefield	4 349	383.4	365	18,337.0	604.49
Mature						
Dalefield Pontiac Wayne	K. G. Fairbrother, Dalefield	6 354	385.0	365	20,008.3	716.51
Ahikouka Midget Sylvia	K. G. Fairbrother, Dalefield	5 239	385.0	365	16,354.8	628.79
Awarima Countess 2nd	Royds & Williams, Five Rivers	5 313	385.0	349	12,138.5	442.02
Awarima Sylvia Rose 2nd	Royds & Williams, Five Rivers	6 293	385.0	278	10,422.7	405.60
Fendalton Burke Posch 4th	Royds & Williams, Five Rivers	6 64	385.0	234	10,258.2	398.14

Milking Shorthorns.

Junior Two-year-old						
Waimea Minga	Mrs. J. Madeley, Kaiapoi	2 40	279.5	365	10,607.5	441.95
Senior Three-year-old						
Bankhead Brunswick 23rd	S. Smith, Rangiora	3 362	348.2	328	12,556.1	493.84
Allandale Melva	R. S. Allan & Son, Hatuma, H.B.	3 363	348.3	365	11,213.4	424.04
Mature						
Allandale Louise	R. S. Allan & Son, Hatuma, H.B.	5 291	385.0	263	10,344.8	437.51

YEARLY DIVISION—SECOND CLASS.

Jerseys.

Junior Two-year-old						
Brooklyn Judy	H. J. Lancaster, Glen Oroua	2 13	276.8	365	8,285.5	521.52
Crystal Springs Shona	W. L. Carter, Shannon	2 3	275.8	365	8,558.8	469.48
Woodlands Golden Slipper	H. A. Lurman, Otorohanga	1 349	275.5	365	7,227.3	385.47
Senior Two-year-old						
Strandon Frolic	J. F. Young, Jnr., Inglewood	2 266	302.1	365	8,788.5	488.34
Three-year-old						
Ku Ku Princess Royal	J. H. Sherrard, Waiuku	3 293	341.3	365	11,182.5	546.59
Huia Millie	H. G. Lever, Otumoetai	3 355	347.5	365	8,401.2	477.16
Pinewoods Standard Kit	A. H. Wright, Waiuku	3 85	320.5	241	7,467.3	381.34
Mature						
Bonavale Adeline	W. J. Chynoweth, Walton	7 360	385.0	365	10,897.5	575.86
Huia Ladybird	H. G. Lever, Otumoetai	5 3	385.0	365	10,568.4	575.56

Friesians.

Mature						
Totara C.R. Parma	Mrs. H. V. Leaning, Cambridge	5 248	385.0	365	27,345.0	910.18
Fendalton Pansy Posch 4th	Royds & Williams, Five Rivers	7 192	385.0	365	14,091.2	632.08

305-DAY DIVISION—FIRST CLASS.

Jerseys.

Junior Two-year-old						
Fairlands Ida	J. Klenner, Kaimata	2 64	256.9	243	5,353.1	261.33
Four-year-old						
Meon Overjoy	A. G. Colson, Bell Block	4 39	327.4	305	9,908.5	483.97
Mature						
Crestdale Petunia	A. H. Burwell, Kaimata	8 17	360.0	305	9,473.8	523.79

305-DAY DIVISION—SECOND CLASS.

Jerseys.

Junior Two-year-old						
O.K. Silky's Cream	Alexander & Schrader, Pakuranga	2 24	252.9	305	5,732.5	325.16
Three-year-old						
Stirling Blonde	J. A. Moffat, Dargaville	3 352	322.2	305	12,592.8	674.12
Mature						
Royal Oak Saucy	A. J. Hale, New Plymouth	6 270	360.0	305	8,702.5	487.99

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Bledisloe Medal Award

Won by Mr. H. J. Andrew, Maheno, North Otago

THE Bledisloe Medal for 1939 has been awarded to Mr. H. J. Andrew, of Maheno, North Otago. This medal is awarded annually to an old student of Canterbury Agricultural College who, by virtue of his training at the college, has materially assisted agriculture in New Zealand or has otherwise forwarded the country's interests.

This medal, accompanied by an endowment fund, was presented to the Board of Governors of Canterbury Agricultural College in 1929 by His Excellency Lord Bledisloe. The Board of Governors, after considering the recommendations of the Old Students' Association, make the award.

Mr. H. J. Andrew was born at Springston, Canterbury, and received his early education at Southbridge. In 1913 he entered Canterbury Agricultural College, Lincoln, and remained in residence for a little over two years, when it became necessary for him to begin farming on his father's farm at Maheno, North Otago. During his stay at the college Mr. Andrew took an active part in student activities, and was a member of the 1st XV.

In 1914 his essay entitled "The Most Suitable Grasses and Other Plants for Permanent Pasture on the Various Classes of Land on the Canterbury Plains" gained the prize presented by the Old Students' Association for the best essay written by a student at the college. He also gained prizes in practical agriculture, and it seems that his early aptitude for the growing of foodstuffs and the feeding of stock has been fully developed in his later career.

In 1915 Mr. Andrew began farming, and it was in that year that the Punchbowl Southdown flock was founded. Among his first purchases were 13 ewes from his grandfather, the late Mr. Henry Pannett, of Springston, Canterbury. This flock had been founded in 1876, and was one of the first registered Southdown flocks in the New Zealand Flock Book. Although Mr. Andrew's chief interest has been in improving the Southdown breed of

MR. H. J. ANDREW.

sheep in New Zealand, he maintains, in addition, a flock of English Leicesters, and also Ryelands. Both these latter breeds have achieved high awards at Metropolitan Shows. The show records and sales, more particularly of the Southdowns, place Mr. Andrew in a leading position in New Zealand as a stud-master.

For more than 20 years the Punchbowl Southdowns have been exhibited at the Christchurch A. and P. Show. Mr. Andrew's ability can be gauged, in part, from the fact that the shield for most points in Southdowns, which has been in competition since 1925, has the name of H. J. Andrew inscribed on it 12 times, and that in two of these years he was not a competitor. The Punchbowl Southdowns have likewise met with outstanding successes at the Royal Shows. Mr. Andrew has gained the championship award for both the Southdown ram and also the ewe at each of the Royal A. and P. Shows for the last five years. He has imported Southdown sheep from both England and Australia, while there is a keen demand for his own sheep throughout New Zealand, and some have been exported to Australia and to South America.

Mr. Andrew is probably the most successful breeder of stud sheep who has passed through Lincoln College, and few men in the Dominion seem to have his genius for mating and feeding sheep to develop the type desired in a flock.

In North Otago, where he has farmed since he left the college, Mr. Andrew has allied himself with organisations endeavouring to foster farming interests. He has been for a number of years a member of the North Otago A. and P. Association, occupying the presidential chair seven years ago. For a number of years he has been a member of the council of the Southdown Sheep Society of New Zealand, and was president in the years 1931 and 1932. He has also been a representative of North Otago on the council of the New Zealand Sheep Breeders' Association.

Mr. H. J. Andrew is highly esteemed for his integrity and his ability as a farmer and a breeder of stud sheep.

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Veterinary Notes for the Farmer

Discussions on First-Aid Measures

Contributed by the Livestock Division

Problems in Breeding of Livestock

AMONG the many irregularities encountered in the breeding of livestock a not uncommon problem is the case of the dairy cow which fails to come in season after breeding normally the previous year. In this case there is a failure on the part of the ovaries to function normally and regularly. The failure may be due to what is known as a persistent *corpus luteum*, or yellow body. This is a body which normally forms in the ovary of a pregnant animal and persists throughout the period of pregnancy. As a consequence, there are no heat periods during pregnancy. If a similar body forms in the ovary of a non-pregnant animal there is also an absence of heat periods.

The treatment of cows affected in this way consists of the forcible enucleation of the yellow body from an affected ovary. Sometimes this is very difficult, and in nearly all cases requires the services of an expert. The ovary is examined and massaged through the wall of the rectum, and if the yellow body is expressed the animal appears in heat in the course of a few days after treatment.

There are many other causes of the non-appearance of heat in animals, and each case requires to be dealt with according to the diagnosis of the underlying cause. Many of the cases require prolonged and special treatment, which is practicable only in the case of very valuable stud animals.

As an example of another breeding problem of a different type, one might take the case of the cow or mare which appears in heat at irregular and too frequent periods. In these cases the ovaries appear to be overactive, but in reality many of the heat periods are false, and are due to disease of the ovaries themselves. The affected animals are frequently in a nervous, highly excitable state, and many mares thus affected exhibit vicious and intractable characters.

In mares it is frequently necessary to spay or remove the diseased ovaries before the animal can be considered suitable for work again. Even in the dairy herd an affected cow proves a disturbing factor, as the heat periods may appear every few days.

Affected animals are referred to as nympho-maniacs, and, if neglected for some time, exhibit certain well-known characteristic tendencies. Old-standing cases frequently require surgical treatment by spaying before the animals will settle down and fatten.

If the animal has been recently affected it is possible that the formation of cysts in the ovary may be the cause of the trouble. In such a case manipulation and massage of the ovaries may reveal the presence of cysts in the organ. Gentle pressure may rupture one or more of the cysts, and, if by repetition of treatment the cysts can be destroyed in the ovary, the animal frequently returns to normal heat periods and becomes a normal breeder once again.

Many breeding problems present themselves to all those associated with the handling and breeding of livestock. When one considers the extent of interference brought about by man in the development of animals for greater and greater production it is surprising that reproduction is not more irregular and more involved. Production and reproduction are so closely related that a true perspective must be maintained if sound progress is to be made.

Breeding Practices

In farming practice there are certain recognised methods of procedure which are adopted with a view to ensuring successful and satisfactory breeding results. In sheep breeding one of the recognised practices is what is known as "flushing" of the ewe flock before mating.

The idea behind the practice is to supply a more stimulating diet for a period with a view to increasing the general vigour and health of the flock. If the general health is improved there is a tendency to greater ovarian activity, so that when the rams are put out the ewes settle readily and a better percentage of lambs will result. The practice also tends to cut down the lambing period and prevent a prolonged lambing in the following spring.

Flushing cannot be practised in all cases, and there is a marked result in the lambing precentages in some districts. So much depends upon the nature of the season and the amount of feed available at or about tupping time. It is generally accepted that in a dry autumn when the flock is on a burnt-up pasture a lower lambing percentage may be expected the following spring. Under such conditions when flushing is impossible, it is most difficult to influence or increase the lamb crop.

While such attention is being paid to the ewe flock, it is advisable to consider the other side of the problem. The ram should be in good health and well fed before being put out with the ewes. If there appears any tendency to foot-rot or lameness, this should be treated before the season is

due. Any lameness causing either disability or fever in the ram will result in a number of ewes being missed and remaining empty.

A sufficient number of rams should be put out, depending upon the type of country to be covered. A periodic mustering of the ewes may save the rams considerably in rough country.

Trial of New Drug In Treatment of Pig Diseases

Some experiments are being conducted under field conditions in the treatment of some of the more common diseases of pigs by means of a new drug of the sulphonamide class. Although a rather expensive drug for the treatment of animals, the reports of results obtained overseas in the treatment of lung diseases, arthritis and enteric diseases of the pig would suggest that the preparation may prove of some value in controlling mortality of pigs on otherwise well-managed pig farms.

The dosage is being tested, as careless use of the preparation would cause toxic symptoms, and controlled experiments are to be conducted in several districts on a few of the more common outbreaks of diseases in pigs. It is intended particularly to test the value of the preparation in the treatment of necrotic enteritis and acute paratyphoid cases. If opportunity offers the preparation will also be tested in cases of acute arthritis of an epidemic nature, or even in the case of pneumonia in the pig. If results warrant it the reports will be made known to pig farmers throughout the country.

It will be obvious that the drug is an unknown quantity so far as the treatment of pig diseases in this country is concerned, and some time must elapse before any definite opinion can be formed. In the meantime, there should be no relaxation of effort in endeavouring to control diseases of pigs by the provision of hygienic, sanitary surroundings and feeding places, by attention to housing and diet, and by isolation in cases of a heavy mortality.

Answers to Correspondents

Strangulation Of The Bowel In A Horse

W.M.C. (WAITOTARA):—

I have recently had a hack mare die under, to me, mysterious circumstances, and I am taking advantage of your veterinary notes column in the "Journal of Agriculture" to place before you as well as I can the points of the case in the hope that you may be able to give me a solution of the problem.

This mare, quite a young beast in good condition, was running with other hacks in paddocks always used as a horse paddock, and at 4 p.m. on one day was to all appearances in normal health, feeding and moving about as usual. It came out after her death that at about 6.30 p.m. on the same day she seemed restless, and was even showing signs of sweating, as if she had been worked. This report was given by the cowboy, who did not, however, mention it at the time. At 6 a.m. the following day the mare was found dead in the sheepyards, and had not apparently struggled exceptionally, but had certainly struggled a little.

The mare was quite stiff and cold, so had probably been dead some hours. The mare had not been working except for an hour in the morning of the day before she died. She was not overheated, and as the weather was very mild the question of a chill would not, I consider, arise.

When we started to move her urine began to run from her at once, and when she was opened there appeared to be urine among her entrails. Her bladder was empty; in fact was quite flat, and though I could not make certain, it appeared to have been burst in some way. Her first stomach was to all appearances quite normal, but in some of the stomach tubes there appeared a dark blood coloured fluid. There appeared to be nothing abnormal elsewhere, and no signs of kicks from other horses, and no signs, so far as I could see, of blood poison-

Breeding Table

Time of Service.	Mares 340 Days.	Cows 283 Days.	Ewes 150 Days.	Sows 112 Days.	Bitches 63 Days.
January .. 1	December . 6	October .. 1	May 3	April 2	March 4
8	13	17	June 8	29	11
15	20	24	13	May 6	18
22	27	31	20	13	25
29	January .. 3	November . 7	27	20	April 1
February . 5	10	14	July 4	27	8
12	17	21	11	June 3	15
19	24	28	18	10	22
26	31	December . 5	25	17	29
March 5	February . 7	12	August ... 1	24	May 6
12	14	19	8	July 1	13
19	21	26	15	8	20
26	28	January .. 2	22	15	27
April 2	March 7	9	29	22	June 3
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May 7	11	13	October ... 3	26	8
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13	18	22	9	December . 2	14
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12	17	21	10	March 3	13
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26	31	September . 4	24	17	27
December . 3	November . 7	11	May 1	24	February . 3
10	14	18	8	31	10
17	21	25	15	April 7	17
24	28	October ... 2	22	14	24
31	December . 5	9	29	21	March ... 3

ing. In fact, we could not find a scratch on the mare.

In the paddock where the mare was running there is no rangiora, no ngaio, and nothing else which to common knowledge is poison. There was no sprayed ragwort, no foot-rot mixture, nor had any sheep been through the foot-rot trough for some months previously. In any case, the sheep are left in the woolshed until their feet are dry after going through the trough.

The sheep dip was emptied last March, say, nine months previously. The dip is drained out in a shallow ditch. The other horses have been grazing all round the dip and yards, and I consider if any poison was left in the shallow ditch, the horses grazing through the winter when feed is fairly short would have been more liable to get into trouble than horses grazing now when feed is plentiful.

I am afraid I have written at some length, but did not wish to omit anything which might enable you to get a clue. I will appreciate it very much if you will publish in the "Journal" your opinion of the cause of the death of the mare.

LIVESTOCK DIVISION:—

Your very full description of the case considerably assists in the matter of forming an opinion as to the cause of death, but you will realise it is difficult to dogmatise without actually being present at the post-mortem examination. It is not likely that the animal was poisoned, as the reasons given by you appear to rule out any possibility of this.

The general opinion to be formed is that the animal was affected with colic in the evening. In all probability the colic was caused by a strangulated piece of bowel, commonly spoken of as twist of the bowel, and referred to by you as a tube with dark blood-coloured fluid.

In strangulation of the bowel the blood supply is cut off, the affected portion of bowel quickly dies, and decomposition or gangrene sets in. Before this stage the animal becomes affected with acute peritonitis, with the formation of a large quntity of fluid in the abdominal cavity, described by you as urine among the entrails.

If this was the sequence of events before death, the animal would not struggle much during the last few hours, being gradually poisoned from toxins formed in the strangulated or gangrenous bowel. It is not likely that the bladder was ruptured or that there was any interference with the normal passage of urine.

It is most difficult to account for cases of strangulation of the bowel, and very little can be done in the treatment of an animal thus affected. The rolling of the animal in the early acute stage may undo the twist and prevent gangrene of the bowel setting in; otherwise the main treatment would consist of medicine to allay the acute pain.

Deaths take place rapidly because of the onset of acute peritonitis. Such cases arise without any apparent cause, such as a fall or a kick from another horse. Strangulation of the bowel may result in an animal in healthy condition following a roll in the paddock.

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BLUE CROSS VERMICIDE has been exhaustively tested under direct Veterinary supervision. It destroys all forms of stomach and intestinal parasites.

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BLUE CROSS VERMICIDE

is given in quite small doses, and it is not necessary to give it on an empty stomach, and under modern methods sheep can be drenched as they stand in the race and almost as fast as they can be yarded up.

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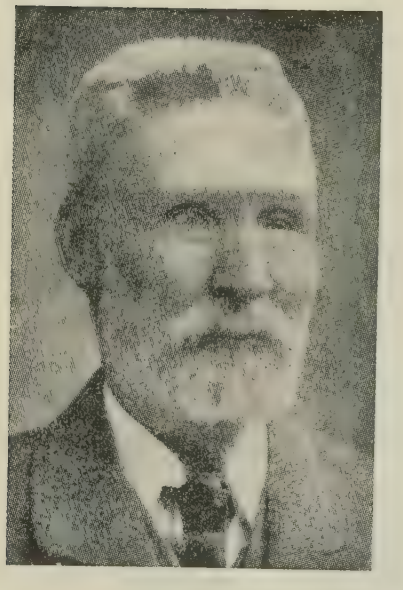
WYNDHAM ST., AUCKLAND

Farm Practice and Management

Contributed by Officers of the Fields Division

Memorial to Founder of Corriedale Breed of Sheep



Mr. James Little.

IN the history of the sheep industry in New Zealand, one of the most outstanding events has been the evolution of the Corriedale breed, the first and only breed of sheep to be evolved in the Dominion, and it is fitting that the Centennial celebrations should include the erection of a monument to the founder of the breed, Mr. James Little, who died in 1921.

Mr. Little was born in 1834, and came to New Zealand in 1863, bringing a consignment of Romneys for his employer, Dr. Webster, who had settled at Corriedale, North Otago. These sheep were not altogether suitable for this class of country, and with his employer's permission, Mr. Little, in the face of derision from his neighbours, set about evolving a half-breed type of sheep which would thrive under the prevailing conditions.

First Experiments

About 1866 or 1867, Dr. Webster handed over to him 600 carefully selected Merino ewes for the purpose of the experiment, states a writer in the "New Zealand Farmer" of December 1, 1921. Romney rams were first mated with these ewes, and later half-bred rams were used on half-bred ewes; this resulted in some fairly close inbreeding.

Straight-out first-cross sheep were also bred at the same time, and a close comparison was made between the inbred half-breds on these first-cross sheep for quality of wool and carcass. The comparison was carried out systematically, and Mr. Little and his employer came to the conclusion that, taking everything into consideration, the sheep that was to become known as the Corriedale in the future was as good a proposition as the sheep sired by a long wool from a Merino at the first cross.

Intensive Breeding

On the death of Dr. Webster, Mr. Little acquired land at Allandale where, to use his own words, "I went for the breeding of Corriedales neck and crop, and put all my eggs in one

The memorial erected at Corriedale, North Otago, to Mr. James Little.

basket." In 1878-79, he bought the biggest framed Merino ewes he could find. He also purchased some of his employer's Lincoln rams as well as one from Mr. George Sutton, of Southland. From one hundred of the best resulting rams, he selected twenty for service, and these were mated with the best half-bred ewes.

Careful management and heavy culling were the two watchwords of the day, and the ideal that Mr. Little kept before him was to get the solid shapely carcass of the Southdown or the Shropshire, covered with a good staple of the right quality of half-bred wool. Constitution and ability to rustle were two of the points that were carefully watched.

Topped the Market

Mr. Little soon had the satisfaction of topping the market for wool, and it was then that he made the error of breeding for finer and finer wool, until he discovered that he was in danger of getting back to the Merino quality, which was not what he intended. The problem that now confronted him was to get a stronger wool on his sheep, and this meant starting at the beginning and breeding a type of ram with the desired quality of strength in its covering.

He procured a score of old Leslie Hills's stud Merino ewes of the strong Murray type from Mr. Duncan Rutherford, and also some from the Horsley Downs Station, and by this means overcame the difficulty with the added advantage of obtaining a needed dash of fresh blood, though, of course, time was necessary to bring about the improvement.

Today, there are approximately 56,500 stud Corriedales in New Zealand, and the Corriedale flocks total nearly 1,400,000 sheep. Not only is the breed securely founded in the Dominion, but a considerable export trade has been built up with Australia, South America, Japan, and other countries.

Pasture Problems of the Arable Farmer

MUCH has been written on the advantages of using superior strains of ryegrass and clover for permanent pasture, and for the dominantly grazing farm the case has been proven up to the hilt. Advice to these people is relatively easy, and may be stated simply, "When you buy seeds, buy only the best."

The use of the word "certified" at the top of this article would probably lead to many of those engaged in mixed farming turning over the page, but it is they who should be most interested. In spite of publicity in the form of lectures, newspaper articles, demonstrations, etc., the majority of the farmers in Canterbury are still using mongrel strains of ryegrass and low-producing types of clovers. It is always easy to induce a farmer to try out something new, such as a special fertiliser or a different brand of oil, but ask him to alter his methods of management and it is a different problem.

Changes in Management

The successful use of the special strains of pasture plants entails changes in the present system of pasture management, and perhaps the biggest factor against their adoption is that there is an outlay of hard cash at the beginning. The man who grows wheat and oats and fattens lambs also, as a rule, harvests his own ryegrass, which is sold off the place at an average price of 5s a bushel, and he is loth to buy in fresh seed with a tag on it at 15s a bushel.

The good resolutions formed after some lecture by an officer of the Department go overboard when he comes to buy his seed, and what usually happens is that a bag or two of the old strain on the farm is retained and sown year after year. The argument is often put forward that the paddock will have to be ploughed again in a few years for rape, turnips, or green feed, so why sow expensive permanent pasture?

In the normal cropping rotation it is seldom possible to get right round the farm with the plough under six years, and what usually happens is that the pastures give young grass for green feed the first year, fair pasture the second year, and are an eyesore for the next four years. In breaking up a paddock for rape the farmer usually chooses the worst of a number of run-out paddocks instead of deciding which is the poorest of many good ones. It is not likely that the Canterbury farmer will ever get away from the plough—in fact, production would drop if he did—but when pastures are sown down for more than two years the superior permanent strains of pasture plants should be used.

Extra Cost Balanced

The extra cost of certified seed spread over five years (supposing it costs £1 extra an acre to sow certified seed) represents an overhead of 4s an acre, and the paddock will not have to show very much increased production to make the proposition profitable. In addition, a crop of certified seed from it will balance the initial extra cost of seed. True, temporary pastures have a place in arable farming, but here

Cobaltised N-C-A WORM DRENCH

FOR THE TREATMENT OF WORMS IN SHEEP AND LAMBS.
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Contains Copper Sulphate (Bluestone), Nicotine-Sulphate, Arsenic and Cobalt combined in the correct proportions to act as a parasiticide. The medicinal dose of Arsenic also acts as a tonic. Cobalt has been found useful in small doses, especially in certain parts of N.Z.

Price 7/6 for 672 Lamb Doses.
Price 4/6 for 336 Lamb Doses.

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again there is a vast difference between the mixed lines sold as Italian ryegrass and the pure certified strain. False perennial ryegrass and mixtures of Italian and perennial ryegrass are much slower growing, and do not produce the same bulk of food as the true Italian ryegrass.

Lack of working capital and courage prevents many would-be progressive farmers from making a start, but the old idea of sowing a nucleus seed block is still a good one. Many farms have changed hands lately, and new occupiers with extensive sowing-down programmes ahead would do well to put down five or ten acres of mother seed ryegrass and mother seed white clover and harvest it in order to have seed available in a year or two. The header harvester contracting in nearly all districts has solved the problem of the labour and machinery required to grow your own seed. The same policy can be advocated for those who wish to start with Montgomery red clover, which is still expensive compared with the common broad red clover.

Palatability

No discussion on ryegrass in Canterbury would be complete without mentioning palatability. The true perennial would not be a perennial if it were as tender and as quick-growing the first year as Italian ryegrass. It must be sown with a good vigorous strain of white clover, and must not be allowed to get away in the spring. The present trend of farming is to eliminate expensive cultivation costs and to topdress with lime and superphosphate to try to hold the pastures. This policy will fail unless it is built on a solid foundation, and the only safe foundation is correct strain in the seed sown.

There are many sheep farms in North Canterbury on which all the pastures can be traced back to one or two bushels of certified ryegrass bought ten years ago at 25s. a bushel. It was harvested and sown around the farm, and now the whole property is down in the permanent strain. From these people one hears only praise of its lasting qualities. Alongside is found the man who has never made a start, still with his run-out pastures.

—A. S. NASH, Instructor in Agriculture, Rangiora.

Clover Dodder Is A Dangerous Parasitic Weed

Fig. 1.—A close-up view of a dodder-infected patch prior to flowering. The numerous thread-like, leafless stems are clearly visible.

ALL farmers are familiar with the more common varieties of weeds which flourish so luxuriantly on their neighbour's farm. Not all, however, will readily recognise the less familiar but highly objectionable clover dodder; and yet, judging from observations during the past year, this weed is by no means uncommon.

Unlike the great majority of weeds which, having green leaves, are able to be entirely self-supporting, the dodder has no green tissue whatever, and can live and grow only by devouring the substance of its unfortunate host—usually red or white clover.

Most weeds are objectionable because they compete with crops and waste ground space, or they may be dangerous to stock or cause taints in cream, etc. Dodder is objectionable because it actually kills the clovers.

Start as a Seed

Starting as a small seed, very like a white clover seed, it germinates in the soil and presently sends forth a thin, thread-like brownish and completely leafless stem, which entwines closely round any clover plants within reach, and may eventually form a dense mat covering an area of several square yards. Once in contact with a clover plant, the dodder sucks in the plant juice through a myriad of tiny suckers which penetrate into the tissue.

Growing at the expense of its unfortunate host—and victim—the dodder ultimately produces a dense mat of pinkish-white coloured flowers, so profuse that the infested area appears to be covered with a rose-tinted snow. These flowers presently produce seeds, which fall to the ground, to cause further trouble next year, or they may be transported in clover seed to spread the weed in fresh sowings.

Difficult to Remove

Because of its similarity in size and weight to clover seed, it is difficult to remove completely every seed of dodder in a line by screens or fans. Where a line of seed is passed over a velvet conveyor, however, the rough dodder tends to adhere to the velvet, while the smooth clover readily falls off.

Dodder seed has also been removed from a suspected line by mixing in fine iron filings. These tend to adhere to the dodder rather than to the clover, so that the dodder can be removed by a specially designed magnetic device.

Eradication

Objectionable as it is in a pasture sward, dodder is doubly undesirable where clover is being harvested for seed, as the presence of even a small percentage in a sample greatly reduces the value of the line. Fortunately for the farmer, dodder has its weak spot. Being an annual, it can readily be controlled by preventing it from seeding.

Where a field is cut for hay and afterwards kept close grazed, this treatment is generally fairly effective, although it may not always be the best management for the pasture, and there is also the possibility that some seeds may survive, to provide further infection.

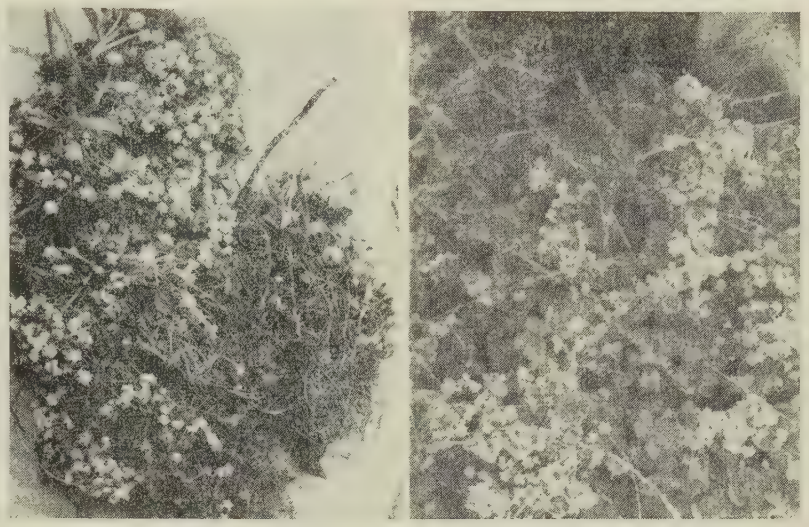

Fig. 2.—Dodder at the flowering stage. Note how the parasite has entwined itself round its clover host. The flowers render the weed very conspicuous at this stage, so that it can be very easily recognised.

Two Methods

For this reason, it is usually the wisest policy to keep all infected patches close scythed, or, better still,

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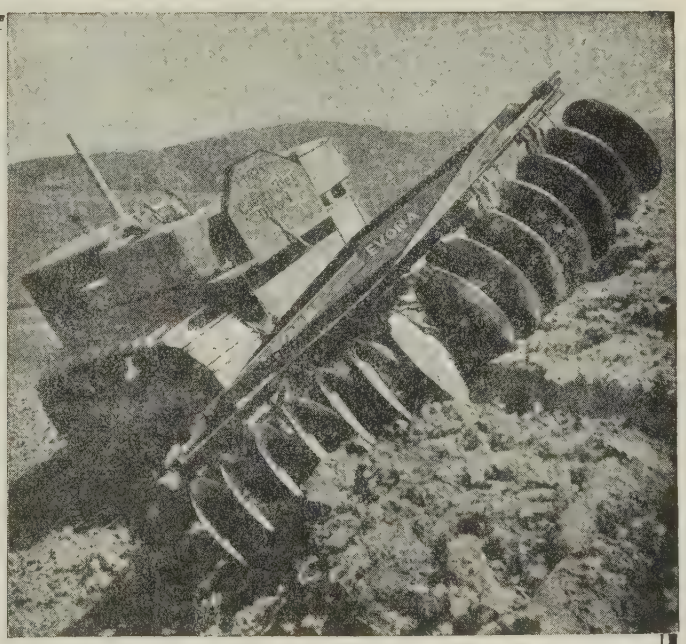


This photograph shows the "Giant" Disc at work on steep hillsides. It has brought in hundreds of acres of virgin land of all classes for its many users. The "Evona Giant" Disc has also proved remarkably effective on blackberry, scrub, ti-tree, tall-fescue, rank paspalum, fern, etc., doing up to 10 acres double cut virgin land in an 8-hour day. The "Evona Giant Chain" Harrow will clean up all rubbish, pull out loose timber, pull down any mounds, and fill up hollows. Work the two implements and you will have virgin land brought into a seed bed of fine even tilth. Note the deep cut when set is applied.

to sprinkle them with a 5 per cent. mixture of sodium chlorate and ground limestone. This latter method has proved highly effective in practice, as the affected clover which acts as the host is easily killed in this way. The grasses also suffer to some extent, but they recover if the treatment is not made too drastic.

Even though the sward on the patch were completely destroyed, however, this would be a cheap price to pay for the certainty of having completely removed the risk of further infection. Dealt with in the early stages, the treatment is simple, rapid, and effective. If the dodder is neglected and allowed to seed, however, it is by no means so easily or cheaply eradicated.

—P. S. SYME, Instructor in Agriculture, Warkworth.

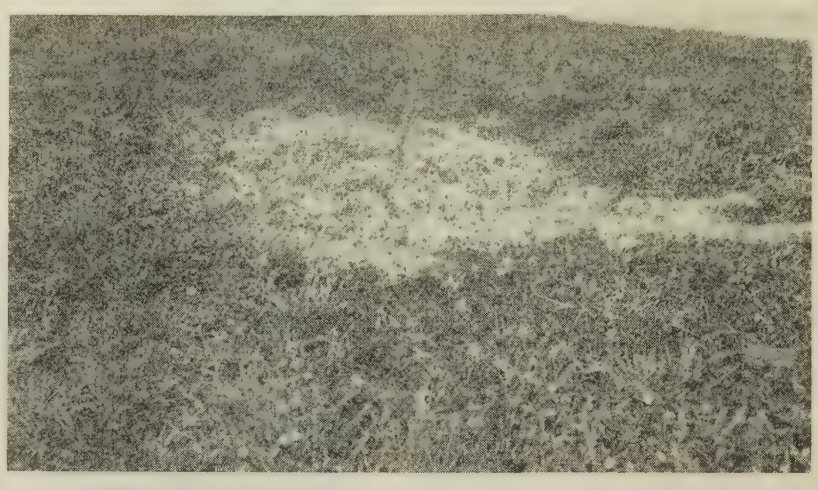
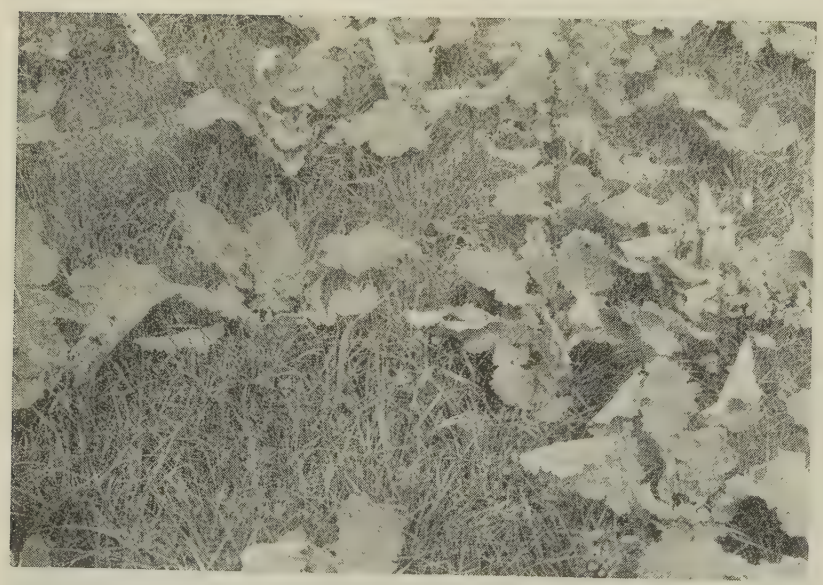


Fig. 3.—A dodder-infected patch which has been treated with a 5 per cent mixture of sodium chlorate and ground limestone. This has effectively destroyed the weed

Lamb Fattening in Southland



Showing a successful establishment of rape and grass.

NEW ZEALAND is one of the largest rape-growing countries in the world, and some years ago the annual crop of rape was about 250,000 acres. Of more recent years, however, the annual acreage of rape grown in this country has decreased by about 50,000 acres, which is definite proof that there has been a greater percentage of lambs fattened directly off the mothers.

This has been made possible by the farmer exercising better management of pastures, by the increased use of topdressing, by the use of better strains of grasses and clovers, and by the greater use of the Down rams. However, the farmer is not always able to fatten all of his lambs as milk lambs, and for this reason he is obliged to grow feed which will enable him to fatten his lambs after weaning has taken place.

Few Rivals

The most commonly used feed for lamb fattening in Southland is the rape crop, and when used for this purpose this crop has few rivals. It supplies an easily digestible food of high nutritive value, especially when properly matured. The stage of maturity is reached when the leaves have turned a silvery green colour and have purplish tinged patches about their margins.

Rape which has not reached the mature stage has a dry-matter-content of about nine to twelve per cent., while the dry-matter-content of matured rape is about 20 to 25 per cent. If fed before it has reached the matured stage, rape is less palatable to stock, does not fatten readily, and may have harmful effects.

In Southland a good crop of rape may supply 30 tons per acre of green food, although this is above the average yield. In Canterbury the average yield is about seven to eight tons per acre, and such a crop is considered sufficient to fatten from twenty to twenty-five lambs. From these figures the area of rape required can be reckoned, and it will be seen that when the Southland farmer is so fortunate

as to secure a 30-ton-per-acre crop he is able to fatten a considerably greater number of lambs per acre.

When sowing the rape crop some farmers prefer to sow blocks of the paddock at such times as will allow for a continuous supply of freshly-matured rape. This, however, is largely governed by the yield of crop produced, as store lambs will be purchased if a surplus results.

As a Nurse Crop

Rape is often sown as a nurse crop to grass. It enables the farmer to be more certain of a supply of feed, for if the rape is a failure he always has the young grass. This is a sound policy under successful conditions, for the variety of feed from the grass and rape is better than rape alone.

There are three methods of sowing rape—ridged, in drills, or broadcast. Undoubtedly, the best crop is procured when the crop is sown in ridges; also, it allows for intercultivation between the rows, which tends always to clean the paddock. Generally, when it is sown with grass it is sown in drills 14in. apart. Were it sown in 7in. rows it would tend to retard the growth of grass too much. When sowing rape it is advisable to sow three to four ounces of mustard with the seed. This plant acts as a blood purifier, and tends to keep the animal in a less heated condition than when fed on rape alone. The feeding off should be done in breaks, and the stock must have access to clean water.

Swede Tops

Another feed used extensively in Southland for lamb fattening is the swede tops. Many farmers favour the method of cutting out the front or incisor teeth of the lambs and letting them feed on the leaves of this crop. By removing the teeth the lambs are still able to break off adequate feed, but are unable to eat or mark the bulb. When marked, the bulb usually rots before it is required for use.

Some farmers in Southland make a point of weaning early and feeding the lambs in this manner, and very often in good seasons may get away all, or nearly all, the fat lambs. Care must be taken to see that the teeth are cut off cleanly and, if possible, below the level of the gum; otherwise, any jagged edges or corners will mark the turnips. A set of sharp pinchers or wire snips are commonly used for the purpose. When sowing the turnip crop with a view to feeding the tops in this manner, it is advisable to sow a small quantity of rape, which may be sown through the manure box of the ridger.

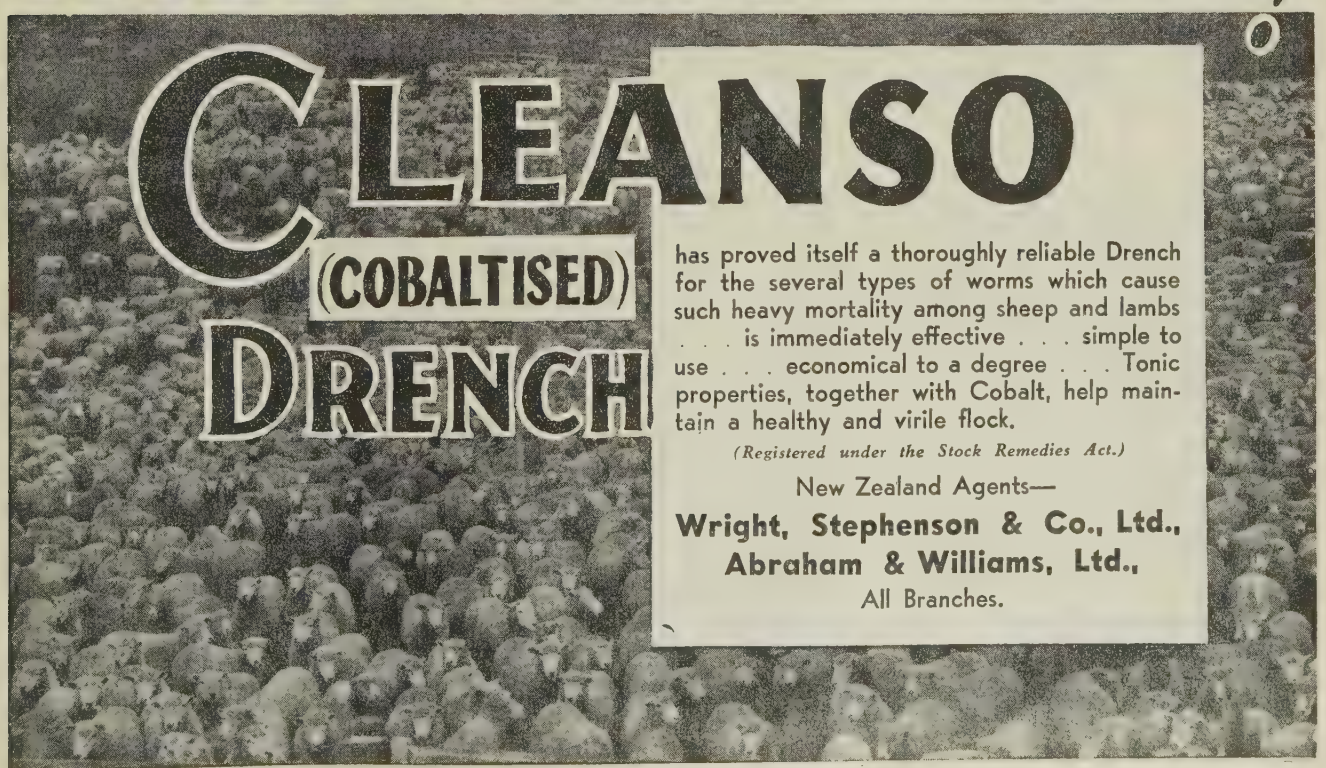
Kale

Where clubroot limits the use of rape, thousand-headed kale is often used as a substitute, and although this crop is recognised as inferior to rape for lamb fattening, it is generally admitted to be superior to chou moellier for this purpose.

Another good feed for fattening purposes is to sow a temporary pasture of Italian ryegrass. Sown early in the spring or the previous autumn at the rate of 25lb. of Italian ryegrass and 5lb. of broad red clover, this pasture will afford a good supply of luscious feed for fattening purposes.

—W. L. HARBORD, Fields Instructor, Invercargill.

KILL INTERNAL PARASITES!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The Orchard and Vineyard

Contributed by the Horticulture Division

Orchard Notes

Final Spraying and Harvesting

SPRAYING operations for the season will be practically finished in most districts, with the exception of further applications of a fungicide for the control of black-spot on late varieties of apples should humid conditions be experienced in the late summer. It frequently happens that a late infection of black-spot occurs on Dougherty and Statesman, seriously reducing quantities which would otherwise have been available for export or fit for inclusion in the higher grades. It is therefore advisable to continue using lime-sulphur 1-180 or Bordeaux mixture 1½-3-50 on these varieties throughout March, and perhaps into April, if conditions favour the development of fungi.

Red Mite

A heavy attack of red mite may cause early defoliation and a premature fruit dropping. The danger is not passed until winter egg-laying is observed, possibly some time in April. Until then, spraying with summer-oil 1-100 may become necessary. It is difficult to cover a tree so completely with spray as to destroy every mite present. Sufficient numbers may be left after a first application to produce a heavy infestation if weather conditions are favourable. A second application seven to ten days later will give comparative freedom from further serious trouble, and such procedure is the best to follow.

Apple leaf-hopper frequently causes much damage late in the season if control measures have not been applied early and before the pest becomes winged. Damage to foliage is one form of injury which should always be guarded against, as it affects the size and condition of the crop. Besides causing damage to foliage, apple leaf-hopper will leave deposits on the fruit, much detracting from its general appearance and lowering the grade.

If leaf-hopper is present nicotine sulphate 1-800 should be included in the next routine spray, or it may be combined with an application of summer-oil which might be used in red mite control.

Harvesting the Main Crop

Under the emergency conditions which exist and the uncertainty as to fruit export which normally provides for the major portion of the apple and pear crop, the customary procedure in handling the crop in districts more interested in export must necessarily be modified somewhat.

Normally the picking of a variety for export begins when fruit is still in a hard condition before reaching full maturity. This applies particularly in cases where a grower has a relatively large quantity of one variety. If fruit which is below export grades is taken off at the time of the earlier picks and marketed immediately, as often happens, it tends to stifle the demand, or at least gives little encouragement to the consuming public to ask for more because of the poor appearance of this class of fruit, and, what is worse, the poor eating qualities at the time.

It is imperative that, with the larger quantities which must be sold locally, quality and condition must be such as to encourage consumption. This can be achieved to a very large extent by growers paying strict attention to maturity when picking and holding fruit under the best possible conditions while awaiting delivery to assembly points.

The general practice is likely to be a delay of a week or 10 days, or even more, from the normal opening date until the picking of a variety should become general.

Selecting Fruit

The grower must secure an advantage in purposely holding back as colour improves so much in very few days at a certain stage of maturity, and a higher percentage of higher grade fruit must result.

Closing dates for fruit packed as for export would still be observed, but maturer fruit of a later picking would still be packed for immediate sale locally as is customary.

Apart from maturity, it is necessary to stress again the importance of eliminating from any grade fruit which is damaged and which may develop rots quickly. Stem punctures, beetle bites, cracks at the stem-end, eye-rot and stings cause rots, and give little storage life to such fruit.

Hard varieties not required for immediate marketing and which normally are held by growers in ordinary storage should be provided with the best possible conditions to avoid undue losses. Fruit should be stored in sound, clean cases, preferably paper-lined, and stacked in a cool place, but not where the fruit would be subjected to draughts; otherwise excessive wilt would occur. It is preferable that the place selected for storage should have

a slightly moist atmosphere. The top cases should be covered. Varieties which might be orchard-stored for later marketing are Rome Beauty, Ballarat, Washington, Statesman, Granny Smith, Sturmer, Dougherty, and Rokewood.

Picking of Canning Peaches

Late varieties of canning peaches, particularly Golden Queen, require to reach full maturity before harvesting. Several pickings are necessary to secure the best results. These peaches, if picked in a green or half-green condition, do not bottle or can well. Golden Queen should gain a full golden colour on the trees to be fully appreciated.

—N. J. ADAMSON, District Supervisor, Nelson.

Viticulture

Seasonal Notes for the Vineyard

WEATHER conditions have up to the present been favourable for grape growing. This makes an early vintage of well-ripened and sound grapes probable. Preventive measures for keeping out diseases should not, however, be neglected.

Provision should also be made for assisting the grapes to ripen by keeping the weeds down and allowing all possible heat to radiate from the soil direct on to the bunches. Leaves between the soil and the bunches may be cut out, but on no account should the grapes be exposed to the direct rays of the sun; black grapes are particularly apt to suffer in quality under such conditions. A free circulation of air should be encouraged.

A second topping may be executed, cutting off any new growth which has appeared since the last operation, and taking care to avoid damaging the rods grown for replacing the previous season's fruiting rods at pruning time.

Menace of Birds

A few varieties may be ripe towards the end of the month, but the main crop generally ripens in March, when every means should be taken to save the grapes from the birds, the worst pest with which we have to contend. Shooting to kill, or using dust shot or No. 12 shot is an effective method of keeping down these pests. Where, because of the proximity of houses or roads, it is not safe to shoot, kerosene or other suitable tins with a few stones in them hung on wires over the vineyard, arranged so that they can be agitated from one or more points of the vineyard, can be utilised.

A certain number of growers use old fishing nets with half or three-quarter inch meshes. Others unroll wire netting along each side of early ripening varieties, attaching the wire to the top edge, and when that variety has been picked, moving it on to later varieties as they approach their ripening period. As a rule, the birds attack only ripe or nearly ripe grapes.

A more expensive but effective and permanent job is to cover the whole vineyard with wire-netting at a height of about 8ft, high enough for horses or a tractor to work under.

A point which unfortunately, either unintentionally or otherwise, is overlooked when gathering grapes—whether they are intended for table purposes (except for jelly-making, when they make better jelly if slightly under-ripe) or for wine-making—is that they should be ripe.

Some varieties, such as the Albany Surprise and Gros Maroc, appear to the uninitiated to be ripe when actually they are far from it, and the public is often induced to purchase these apparently early grapes and pay a higher price than their condition warrants. The result is that the demand slackens and the higher prices which should be obtained for early ripe grapes coming from better situated or better cared for vineyards or vineries are not realised.

For making wine, ripe grapes are essential. The difference made by leaving the grapes on the vines a few days longer until they are ripe often results in the difference between a good and a second-rate wine.

With a little experience, ripe table grapes can easily be distinguished by their appearance and flavour. For wine-making it is necessary to obtain more accurately the sugar and acid contents of the fruit. The density, which corresponds approximately to the sugar-content, can be ascertained by the use of a mustimeter, saccarometer, or densimeter (Baume, Brix, or Saleron and others), and the acidity by the acidimeter, using a titrated alkaline solution, as is practised in butter and cheese factories in New Zealand.

The Cellar

Preparation for the coming vintage should be completed, including the overhauling, if not already performed during wet weather, of the cases and vessels used for transporting the grapes.

The bottling of all wines estimated to be required for the next three or four months should be terminated before vintage begins. Wines bottled during vintage are apt to set up a slight fermentation, due to the innumerable ferments and spores present, and become cloudy and otherwise unsaleable.

The Vinery

Particular care should be paid to ventilation and to freeing the bunches from cracked and diseased berries. Scalding of the leaves and berries is apt to occur at this period in vineries which are not opened up early in the morning to allow the moisture which accumulates on the foliage and grapes during the night to evaporate. This is particularly noticeable where the leaves are allowed to grow too near the glass.

To avoid this, the rods should be hung at least 18in from the glass, and this is best done by hanging the rods from the wires by fairly thick wire hooks, which do not, like some materials, harbour mealy-bugs and other pests. The hooks, moreover, are permanent, and the rods can be released from them with ease for cleaning and pruning.

Where the foliage is very thick above white varieties which are approaching ripeness, some of the leaves can be removed gradually to allow more sunlight to enter and thus obtain that golden tinge so much admired on these varieties.

—J. C. WOODFIN, Vine and Wine Instructor, Te Kauwhata.

Citrus Notes

Sowing the Autumn Green-Manuring Cover Crops

BY late February citrus growers will be preparing for the sowing of the autumn green-manuring cover crops, which generally succeed best under average conditions when sown in March and ploughed in towards early spring. The reasons for this practice of green-manuring are worth noting.

Green manuring is practised in order to maintain or increase the decaying organic matter of the soil, known as humus. Humus is one of the most serious limiting factors in orchard practice, and New Zealand soils generally are deficient in humus. This decaying organic matter, while providing the trees with available plant foods, also has a marked improving effect upon soil tilth, and herein lies its advantage over purely inorganic fertilisers. It is for this reason, also, that when inorganic fertilisers are used green manuring is also advocated.

Gauge of Fertility

This decaying organic matter, or humus, is probably the most important substance in any fertile soil; in fact, humus may be taken as a gauge of fertility. This organic matter increases the water-holding capacity of light soils, and improves the aeration of heavy soils. It is also the source of energy of the soil bacteria, which in turn liberate the nitrogen in the organic matter. In the case of leguminous plants these bacteria absorb the nitrogen from the air, making such nitrogen (generally in the form of nitrates) available to the trees. Humus also holds plant food in solution until the trees can absorb it.

The supply of organic matter in the soil requires to be renewed constantly if fertility is to be maintained, and it would often be better if the time and energy spent on the cultivation of the lighter soils of the citrus belt were diverted more to the maintenance of the organic matter in the soil.

Organic matter can be increased by the growing of weeds, green manuring crops or leguminous cover crops. Naturally, the leguminous plants are the most valuable, as they increase the supply of available nitrogen as well as increasing the organic matter when ploughed under.

Standard Cover Crop

The standard recommended leguminous cover crop is the blue lupin, and on all areas where this crop can be grown successfully it is sound practice to maintain the annual procedure of growing and ploughing in blue lupins. Sow at the rate of 1½ bushels per acre, with 4 cwt. of superphosphate per acre. Where citrus groves are bearing heavy crops which require to be harvested during July to September before the lupins are ploughed in, it is often a good plan to sow alternate lands in alternate years.

Although non-leguminous, oats is another good green-manuring crop which provides a bulk of material for turning in or for using as a mulch around the citrus after cutting. Sow at the rate of 1½ bushels per acre, together with superphosphate at 4 cwt. per acre. Other green-manuring crops being tested in citrus areas are Austrian winter field peas, mustard, and vetches.

Besides increasing the organic matter, a green-manuring cover crop over the winter months prevents soil washing or scouring—one of the most destructive processes by which valuable soil is lost in citrus groves. It also opens up the soil, preventing any hard pan at a certain distance from the surface as is commonly caused by ploughing or cultivation to the same depth each year.

Spraying

As mentioned in last month's notes in the "Journal," March is the most important month in the year for the application of certified summer-oil sprays. In every orchard one application of 1 part oil to 33 parts water should be made to keep all scale insects in check. Where the red scale has proved troublesome, two applications of a certified summer-oil should be made at an interval of about three weeks.

—A. M. W. GREIG, Citriculturist, Auckland.

Cool Storage Notes

Checking the Efficiency of Equipment.

THE importance of checking up on the accuracy of thermometers used for indicating the temperatures of cool storage chambers should be fully appreciated by those responsible for the management of cool storage plants.

The refrigerating engineer should be instructed while overhauling the refrigerating plant to inspect the ammonia pressure gauges in order to detect faults and to make the necessary adjustments. For the purpose of checking thermometers a special observatory-tested mercury thermometer should always be kept on hand.

Within certain limits the engineer or operator of a refrigerating plant has control of the conditions that make for greater economy of the power in-put to the compressor. It would be quite possible, for instance, for one man to use a third as much power again as another to do the same refrigeration work in the same plant.

The several factors which will lower the efficiency of the plant are as follows:—

Both inadequate, insufficiently cool, or unevenly distributed water on the condenser coils, and air in the ammonia system result in high head-pressure and increased power demand. Similarly, a shortage of ammonia in the system, careless adjustment of the expansion valves, or faulty valve seating will result in lowered thermal efficiency. Oil should be purged from the ammonia system at regular intervals.

The importance of having a plant correctly proportioned to the size of the cool store and the through-put of fruit will be realised when it is remembered that this condition affects running costs. In particular may be mentioned: (1) Capital charges and depreciation; (2) the running hours and the effect on wages; (3) the demand charges of the supply tariff; and (4) thermal efficiency.

The full control of temperatures within the range and time required is essential.

—A. POWELL, Cool Storage Officer, Wellington.

The Home Garden

Vegetables, Small Fruits and Flowers

Vegetables

Storing Potatoes and Onions

F. SYDENHAM, Asst. Horticulturist, Wellington

POTATOES and onions differ considerably in their storage requirements. Potatoes must be kept cool and in a humid atmosphere to prevent shrivelling, and onions must be kept cool and dry to prevent rotting. Both crops, if sound and well cured, keep well when the conditions of storage are suitable.

Potatoes, carrots, parsnips, swedes, etc., may be stored in different ways, but the essential conditions of a store are that it be cool and clean, with sufficient ventilation to remove foul air, and with a sufficiently humid atmosphere to prevent shrivelling. For potatoes, it should also be dark to avoid greening of the tubers. The store may be in the form of a basement, usually of concrete, or a lean-to shed on the southern side of a building or among trees where it is not exposed to the direct rays of the sun. An earth or concrete floor is most suitable. The crops may then be stored in sacks, bins or boxes.

With these permanent structures a thorough annual clean-up is essential. Any decayed vegetable material is a source of fungous and insect infection, and, together with old sacks and rubbish, should be burnt. The walls should be cleaned of dust and cobwebs, and either whitewashed or sprayed thoroughly with a strong solution of fungicide. Suitable solutions to use are 1 part of lime-sulphur to 15 parts of water, or 1 part formalin to 50 parts of water. The bins and boxes should not be neglected in this treatment.

Pits or Clamps

As an alternative to these structures, and when there are large quantities to store, they may be stored in pits or clamps in ground which drains freely. The roots are stacked on a foundation of brush or straw and covered with similar material and soil. There is no need to make a pit, for the crop can be stacked on straw on the ground and finished off with a covering of straw and soil. When these latter methods of storage are practised it is advisable that the soil possess good drainage and that an elevated piece of ground be selected. In both instances the stacks are finished off with sloping sides to run off the rain, and a drain is dug round the stack to carry off surplus moisture.

There is no limit to the length that clamps can be made, but the produce must not be stored in such bulk that heating develops. The depth must be such that the weight of produce does not crush and damage the potatoes at the lower levels. Pits are usually made 5ft to 6ft wide at the base, and stacks a similar width at the base and 4ft to 5ft high at the ridge.

Onions

Onions require different conditions of storage. Conditions for this crop cannot be too dry. A cool, dry and well-ventilated shed is most suitable for the purpose. Dryness is most important.

In small quantities they may be spread on shelves or plaited into cords and suspended from rafters. In larger quantities they may be stored in open-mesh sacks or loose on shelves at such a depth that air can circulate freely among them.

Seasonal Don'ts

Don't

neglect to apply liquid manure to plants which it is desired should make vigorous growth. During the hot, dry season it is practically impossible to obtain good lettuces if liquid manure is not used. Transplanted crops, such as cabbages, leeks and celery, are greatly benefited if they receive one or two dressings of liquid manure. Liquid manure is best made from fresh farm manure, but an alternative to this, using artificial manures, was suggested in last month's notes.

Don't

allow rhubarb to run to seed. To produce a seed stalk energy that should be stored in the roots is used. This does not assist production during the cropping season.

Random Notes

Care of Garden Tools

ALL gardeners are not in the fortunate position of having stainless-steel garden tools. Desirable as they are, the cost is almost prohibitive. However, with very little trouble the garden tools can be kept in good order.

There are too many instances where tools are left outside in all weathers, and far too many are put away after use with a coating of damp soil on them. When this is done they become pitted with rust, with the result that the keenness of the cutting edges is lost.

It is an easy matter to remove the coating of soil from these tools, to dry them, and then to rub them over with an oily cloth, which may be hung up in the tool shed for this purpose. They will then remain sharp, and the energy expended in using them is reduced to a minimum.

Poison Bait for Slugs

IN a previous issue of the "Journal" (January, 1939) a review on this subject using "Meta," a form of solid fuel used for heating small domestic appliances, was made by Mr. W. Cottier, Plant Diseases Division, Department of Scientific and Industrial Research. With the autumn approaching, slugs and snails will be causing further havoc among plants, and a further note on this substance, which is proving most efficient in the control of slugs and snails, is given.

"Meta" is sold in the form of white tablets, each weighing approximately 4 grammes, and packed 50 in a packet, which retails at about 3s 6d. To prepare the bait, powder one of these tablets and mix it thoroughly with about a quart (½ lb.) of bran which has previously been made crumbly with water. Dry bran may be used where the soil to which the bait will be applied is moist, or where a quantity is prepared for future use.

The bait may be broadcast among plants, but is more effective when placed in small heaps and protected from rain. English experience ("Journal of the Ministry of Agriculture and Fisheries," Vol. 44, No. 3, 1937) suggests that, when protected from rain, it is effective for six weeks and longer.

"Meta" is poisonous to humans, and every care should be exercised in handling the tablets and the prepared baits.

Saving Tomato Seed

THOSE to whom tomatoes are a crop of considerable importance frequently save their own seed. This is done from the present crop. If fruitful plants which are robust and free of disease and of the type suited to one's requirements are carefully selected, a good type of seed should be saved. This seed has certain definite advantages. Besides being of the type desired, it will be thoroughly acclimatised.

Individual plants showing the desired characters are selected, and are marked in such a way that the fruit will not be picked for market or home use. The tomato plant is naturally self-pollinating, and there is little likelihood of serious cross pollination taking place. All the seed on each plant will be similar genetically, whether it be taken from large or small fruits. Small fruits, usually at the end of the bunches, are small only because they have received a restricted amount of sap. Yet it is not advisable to take seed from them, as it may not be as well nourished as that from better-developed fruits. Consequently, it is advisable to prune these small fruits from the bunches that are saved for seed.

Treating the Seed

The fruit is allowed to ripen completely on the plant before picking for seed. It is then cut in halves and the pulp and seed dropped into a vessel containing a little water. After seed has been taken from the quantity of fruit the vessel containing the seed and water is left for a few days in a warm position, and when fermentation begins its contents are poured through a sieve and the seed washed free of its adhering fragments of pulp by holding the sieve under a tap so that all the seed is exposed to the force of the water. The seed is then emptied on to a dish or piece of glass and placed in a position where it will dry quickly. Stir occasionally so that the seed does not stick together, and

What to Do in the Vegetable Garden this Month.

Summary of operations for the month (until the middle of March).

SEEDS TO SOW.

For winter use: Spinach, lettuce, silver beet. For spring use: Carrots, cabbage, and cauliflower.

PERENNIAL CROPS.

Remove and burn asparagus tops as the berries begin to turn colour and before they fall, in order to prevent undue seeding. When they reach this stage the fronds are not of great use to the plant.

SPECIAL NOTES FOR WARM DISTRICTS.

Continue successional sowings of dwarf beans. Make sowing of spring cabbages.

SPECIAL NOTES FOR COLD DISTRICTS.

In the colder parts of the South Island sow onion seed early in March to produce seedlings for spring planting.

CROPS TO HARVEST.

Harvest main-crop onions when their leaves show signs of yellowing and the tops fall.

Harvest main-crop potatoes when the leaves and haulms die and when it is considered that the tubers will fall freely from the stems without shaking. In cold districts where the tubers remain dormant they may be left in the ground for several months.

GENERAL WORK.

Keep the hoe moving to destroy weeds and to maintain a surface mulch.

Apply liquid manure to salad crops and to recently transplanted crops.

Thin out seedlings as they become large enough to handle.

Spray to prevent disease, and use Derris dust to check the white butterfly larvae.

Plant cover crops in any ground from which a crop has been harvested and in which another crop is not to be planted immediately.

Lift kumara runners from the ground occasionally to prevent their rooting at the joints.

store it only when it is thoroughly dry.

Tomato seed, when thoroughly ripe and properly dried, will retain its vitality for about five years at least if kept cool and dry. When the conditions of the crop are favourable for a good seed harvest it is wise to take more seed than is required for next season's crop in order to provide against unfavourable contingencies in later crops. It is advisable to indicate the year of harvest on the seed container so that there will be no doubt as to the year in which the seed was saved.

The Flower Garden

The New Lawn

BEYOND general routine work—such as the sowing of hardy annuals and biennials for autumn planting and the pricking out of these into boxes to produce sturdy plants, and the planting of bulbs—there is not a great amount of work to do in a garden which is established. .

Where, however, new grounds are being made, alterations planned, or extensions made, the work should be pushed ahead so that beds will be ready for planting in the autumn. This also applies to areas which are to be put down to lawn.

This month a description of the laying down of a new lawn is given. This will be followed next month by notes on the management of established lawns.

Preparation of Ground

A lawn is one of the main features of the garden, and once put down should, if well managed, remain for many years and probably indefinitely. The cost of seed is high and much labour is required, so that the job should be done thoroughly.

In the laying down of most lawns a considerable amount of levelling is required. To obtain a lawn which will make even growth it is necessary to remove the top soil and level the subsoil as required, and to put back the topsoil in an even layer over the entire lawn. Where this is not done the grass will grow vigorously where there is a greater depth of good soil, and will grow very poorly and burn up badly in the dry season where the soil is very thin and where it may be growing on almost pure subsoil.

Drainage

The condition of drainage of the subsoil is of great importance in determining the grade of the lawn. If the drainage is bad the final surface should slope in such a way that surface water which accumulates in wet weather will drain away from buildings and to some point where it can get away. If the subsoil is porous and the water gets away readily the slope of the lawn is not of such great importance, and many useful effects such as sunken lawns and terraces can be introduced with effect into what would otherwise be level lawns.

Whenever any fillings are made it is necessary to allow time for them to consolidate, or irregular depressions will appear after the lawn is established. When time cannot be afforded this consolidation can be expedited by using a heavy roller, or preferably treading the ground firm. Treading is slow work, and requires a tremendous amount of energy, but it is most effective in consolidating loose patches. Drains, where necessary, may be laid before the top soil is put back.

After the ground has been levelled, as required, the top soil is placed on it to the depth of at least 6 inches and raked to remove any pieces of rubbish it might contain. If the ground is heavy, agricultural lime at 1 ton per acre or ½ lb. per square yard should be applied. Such operations should be completed some time before the time for sowing seed so that weed seed that may be present in the surface layers of the soil may germinate and be destroyed by the final cultivations before sowing. Should the ground be very weedy, it may be advisable to delay planting for a season so that the ground may be thoroughly cleaned. A crop of potatoes is a good cleaning crop.

Sowing the Seed

Before sowing, the land requires a good rolling, as the seed establishes best when the ground is firm. A dressing of quick-acting artificial fertiliser should be given. The amount applied will depend on the fertility of the land. A mixture of 4 parts of superphosphate and 1 part of sulphate of ammonia at the rate of 5 cwt. per acre or 2 oz. per square yard on soil of average quality will be of great assistance in establishing the lawn. It is applied before the final raking of the surface. after which the seed is sown.

The seed used is an important factor in producing a fine lawn, and seed of the best quality should be sown while there is still sufficient warmth in the ground to obtain proper germination and establishment before the cold weather sets in.

Amount to Sow

The conditions of soil fertility, the state of the seed bed, the weather, and the depredations of birds must all be taken into account when determining the amount of seed to sow, and it is wise to err on the side of too much seed rather than too little. As a general rule, however, three-quarters to 1 oz. of seed per square yard should be used, the higher amount on areas, such as tennis courts, which will be subject to much wear.

As a lawn is likely to be down for a lengthy period, only permanent grasses should be sown. These establish rather slowly, and frequently quick-establishing grasses, such as crested dogstail, are included. It cannot, however, be recommended, as its rapid establishment hinders the establishment of the more suitable grasses. As a general recommendation, 2 parts of Chewings fescue and 1 part of brown top will be found suitable for most purposes, and will produce a very fine-leafed lawn.

The seed should be sown and raked in. So that these operations may be carried out efficiently, the ground should not be wet from recent rains. Bird scarers, pieces of paper, cardboard, and tin, etc., loosely suspended from cords drawn 3 ft. or 4 ft. above the lawn are useful when the area of the lawn is small. If a heavy seeding is made, however, birds should not do much damage.

Management After Sowing

If conditions of temperature and moisture are suitable the seed germinates very quickly, and in a week or 10 days the seedlings will be showing above ground. Thereafter the grass is allowed to grow, and when it has reached the height of about 4 inches it is cut with the lawn-mower specially sharpened to cut and not to pull the grass, and set high so that as much as possible of the growth is left on the plants.

It is not until well into the spring, after the autumn sowing of lawns, that the mower is set to its normal cutting level. Frequent rolling in the early stages of lawn establishment assists the tillering of the plants, and levels and consolidates the surface of the ground.

APIARY NOTES

Contributed by Officers of the Horticulture Division

Further Points in Extracting

BY the time these notes are published the first main extracting of the honey crop will probably have been completed.

Some beekeepers prefer to leave all the extractable honey in the hives until March. This can be done successfully where there is an ample supply of extracting combs and spare supers, but in a good honey season, as the present season gives promise of being, very few bee-keepers have sufficient spare combs to adopt this method. To get the best results in such cases it will be necessary to keep the extractor going in order to cope with large quantities of honey coming in. Those who have not been in the bee-keeping business very long will rarely have sufficient spare supers and combs.

Extract Only Ripe Honey

In a season such as that which we are now experiencing it is a great temptation to begin extracting before the honey is properly ripened on the hives. A note of warning may therefore be given to refrain from extracting until at least three parts of the combs are fully capped over, and in damp or humid districts it would be safer to see that all combs are fully sealed before removal.

Returning Empty Combs to Hives

When the combs are extracted they can be immediately returned to the hives should the honey flow be in full swing, but in places where there is a tendency for the flow to slacken off it will be wiser to leave the replacement of the combs until evening, when the bees have quietened down for the night. It may now be rather late to give the colonies frames of foundation only, but if the hives are full and drawn combs are not available a few may be tried out in case the flow is prolonged.

Removing Honey From Hives

In taking frames of honey from the hives for extracting it will be found much quicker and easier if two persons work together. One should bring the barrow, on which is placed an empty super and a clean corn sack, while the other gives a few puffs of smoke in the entrance of the hive. The cover is then lifted and the mat removed, smoking the bees from the top. The combs are now removed one by one and most of the bees dislodged by giving it a sharp jerk downwards.

The frame, if found well filled with honey (and that mostly capped), is then handed to the other person, who removes any bees still adhering to it by gently brushing them off with a bee brush or a handful of grass. He next places it into the super on the barrow and covers it with the sack. Each succeeding comb is treated similarly until the super is empty, when it can be removed, given a dump on the ground to dislodge any bees, and then placed on the barrow ready to receive the frames from the next super.

Allocating the Work

In large apiaries it is generally found best to employ three, or even four, persons, two being inside the honey house uncapping and extracting, and one or two removing the honey from the hives; but with modern machinery and large, power-driven extractors, when sufficient frames have been uncapped to fill the extractor one person can keep going with the uncapping and attending to the extractor with a little help occasionally.

As our notes are more for the beginner, it is with the person with a few hives and only a two-frame extractor that we are more particularly concerned. In such cases it may happen that only one is available for the extracting, and this makes the work very much more difficult. Where only one is available, it is best to remove sufficient to keep him going for at least half a day.

He will then have to uncap, do the extracting, lift the honey to the strainer, see that the honey does not overflow the tin from the extractor, and replace the combs on the hives. This means much hard work, so that, if possible, it is best to obtain additional help for a day or two at least. It may not always be possible to get help among the bees, but one can generally secure the services of a strong youth to help in the honey house.

Uncapping Knives

The beginner will find it a great help in uncapping if he sees that his uncapping knife is kept very sharp. Once it has a keen edge it can be kept in good condition by an occasional rub with an oil-stone. Many bee-keepers use a "cold" knife, which is satisfactory for good, thin honey, but with honey from mixed sources and the heavier kinds it is generally found necessary to use a hot knife.

In large apiaries the steam-heated knife is used. The old method was to have a deep tin filled with hot water in which to keep the knife when not

(*Continued on page* 151.)

Notes for the Poultry Farmer

Contributed by Officers of the Livestock Division

Seasonal Culling and Selection Of Breeding Stock

ONE of the most essential factors in the successful management of poultry is the knowledge of how to select stock of good breeding type, combined with constitutional vigour and high productive capacity. It is also necessary for this knowledge to be put into practice at the correct period of the year for the selection of the following season's breeding hens and the culling of unprofitable birds from the flock.

In commercial flocks the culling of the weaker specimens should be carried on continuously throughout the year. However, with the approach of the late summer and early autumn months, the moulting period sets in; therefore, the period during the latter part of February and during March, or just before the moulting process begins, will, as a general rule, be found to be the best time to do this work. The practical poultry-keeper fully realises that there are certain signs which manifest themselves at this time and indicate whether a bird has been a heavy producer or whether she is likely to be worth keeping for another laying season.

Will Combat Disease

While the outstanding points of those birds possessing constitutional vigour, breed type, and good production are more easy to observe and prove of a great assistance in the final selection of coming season's breeding stock, experience has proved beyond all doubt that the careful selection of breeding stock possessing the desired stamina year after year will do more to combat sickness and disease than any other known means. Anyone desiring to make a successful undertaking of poultry-keeping would be well advised to make a very careful and close study of these points during the coming month. A little further explanation to the smaller poultry-keeper or those who have not had that practical experience is well worth while.

It would be difficult and almost impossible to describe the different types of the many breeds of poultry in this Dominion. What applies to one breed does not necessarily apply to another so far as the particular shape and breed characteristics are concerned. Therefore, it is essential for anyone breeding pure-bred poultry to possess some knowledge of the correct shape and characteristics peculiar to the breed in which they are interested.

Although the breeds of poultry may differ a good deal in shape and characteristics, birds possessing egg-production capacity, combined with constitutional vigour, have the same outstanding points when kept under normal conditions. Careful study of the remarkable egg records which have been established in our public egg-laying competitions will be convincing evidence that the laying hen is one of the most productive and profitable kind of livestock kept, particularly when one considers that an egg is the most highly concentrated form of food known to be produced in the animal kingdom.

Strain of Heavy Laying

When the immense strain which heavy laying entails on the system of the hen is considered, is there any wonder that towards the end of the laying season those birds which do possess the egg-productive qualities—stamina and constitutional vigour—stand out from the other birds in the flock? Improvements made in the egg-production of our domesticated hen of today have been built up by studying these points and selecting for breeding only stock of the best breed type and other most essential qualities.

It may be difficult to convince a few of the hard-headed commercial poultry-keepers of the true values of breed type, but it should be remembered at all times that we breed with the object of improving the good qualities and that any undesirable characteristics in the birds being bred from are equally intensified. Any stock showing weakness or undesired characteristics should not be selected for breeding purposes, irrespective of their egg-laying qualities or other good features.

Essential Points

Success can be achieved only by the combination of all desirable points—stamina, purity of blood, constitution, capacity, quality and size. These are essential to make a hen a producer and re-producer of stock. Any bird lacking or poorly developed in any one of these points cannot respond profitably to the food and attention given her. The only infallible guide for laying powers is to keep a record of the eggs laid by each individual bird by means of trap nest or single pen.

These methods are useless, however, if birds of poor breed type or weak characteristics are tested or bred from. The work and additional cost entailed in these systems could not be undertaken economically where large numbers of poultry are kept, but the experienced breeder of poultry depends mainly on the selection on form. To those who possess the practical eye there is little difficulty in selecting the best for breeding.

Start of Laying

Good pullets, hatched in the spring, usually begin to lay at about six or six and a half months of age, and, if well done and properly managed, with good housing conditions and careful feeding, they will keep laying continuously for 12 to 13 months in their first laying season. This phenomenal egg-production, it will be readily realised, is more or less artificial, just as much as the great butterfat returns produced from our modern dairy cow. Nature never intended that fowls should produce so many eggs, and it is only the work of breeding and selection of the best that has increased these producing powers to enable the greatest number of eggs to be produced in the first few laying seasons.

It will be easily understood that the body of the laying pullet is fully taxed when it is being compelled by systematic feeding and management to lay continuously for a period of 12 months and more. Naturally, those **birds which do not possess strong** constitutional vigour will be unable to stand the strain which heavy laying entails. The constant drain on the bodily resources caused by heavy egg-production after nine or ten months begins to tell on the weaker specimens, and they are compelled to rest. During this period it is usual for them to begin losing their feathers and to begin growing a new coat. This class of bird therefore becomes easily distinguished from the other good layers in the flock.

Moulting

Moulting, or the production of a new lot of feathers, calls in the early stages for more nourishment from the food consumed and any reserve condition the bird possesses on the body. It is therefore almost impossible for a hen to continue laying and at the same time pass through the moulting process. The nourishment from the food consumed by a hen builds up the waste tissue and maintains the natural heat of the body, and any surplus passes into the production of eggs, flesh and fat, or the making of new feathers.

Generally speaking, when fowls began to moult from natural causes early in the season it is a wise precaution to cull these birds. Birds seldom begin to lay in the second laying season before the end of June or early July. Therefore, those birds which are compelled to rest early and begin to moult in January, February, or early March would be resting for four or five months before beginning to lay again, whereas the good layer which has the strong constitution continues to lay, under normal conditions, until the end of March and well into April before beginning to moult. These good birds pass through the moulting period quickly, and are only resting for 10 or 12 weeks of the year. It should therefore be readily realised which birds are the best to keep.

Saving of Feed

If poultry-keeping is to be made profitable every avenue by which the cost of feeding can be reduced, at the same time maintaining a successful reduction, should be thoroughly investigated as a matter of common sense. It is useless keeping for the second season's laying birds which will be non-producers of eggs for four or five months, and, as suggested, it is wise to cull and dispose of these birds. Continuous culling of a flock between the end of January and the end of March will result in a considerable saving of feed, and should appeal to poultry-keepers in these days of high costs of foodstuffs.

Early moulters are easily distinguished from other birds in the flock. They are pale in colour of face and comb, with a drying tendency and stiffening appearance of the comb and a dull expression in the face, and with feathered eyebrows indicating a weak constitution. The body will be full of pin feathers, particularly on the back. The abdomen will have a tucked up appearance, and if the bird is handled it will have a coarse, stringy or hard texture. In the case of yellow-skinned birds, a cream colour will be noticed coming back into the legs and beak.

On the other hand, the good laying specimens will be noticed with all their old feathers on. The plumage lies tightly to the body, and is faded and shabby, often dirty and dry in appearance. The face and comb will be bright red in colour, and more often than not the smaller feathers of the head and upper part of the neck are completely worn off, showing the same bright red colour as the comb and face. The boldness and brightness of the eye are outstanding, and these characteristics are particularly good points, indicating strong constitution and vigour.

Short Tails

In most cases the tails are worn short, showing the continuous visits the bird has made to the nest box during the year. Each time a visit is made the hen turns around to make herself comfortable and the tail is brought into contact with the sides of the nest, thus causing it to become worn and quill-bare. The same thing may be noticed in some of the covert feathers of the wings. It is an old saying, and quite a true one, that, "she has laid her tail off." This, of course, is more noticeable in breeds with hard tail feathers, such as White Leghorns. The abdomen is generally well developed with a full appearance, and if the bird is handled it will be found **soft and full, something like a rubber** bag full of warm water.

The legs and beak at this season of the year are pale and bleached in colour, and that rich, yellow colour noticed in many breeds when in full new feather will have completely disappeared. The yellow pigment in the legs and beak of the yellow-skinned breeds of fowls is an indication of surplus fats and oils in the body, just as is the glossy green sheen of the feathers in the black-coloured varieties. In black-feathered birds the indication in feathering most desired in the heavy-laying hen at this period of the year is the fading of the feathers to a rusty brown colour, while the other outstanding qualities mentioned of the comb, face, head, eyes, and abdomen, etc., are exactly the same. This applies to all breeds which possess **high egg-laying capacity.**

These features are so noticeable and easily detected in February and March that even a person with very little experience should not find any difficulty in making a reasonable selection of the laying bird from the non-producer. The training of the eye and quick judgment in this work will improve with practical experience. With the information now available on this subject, there is no need to be guessing about the producing qualities of the domesticated hen at the end of the laying season.

Selection of Stock

Just as it is important to make the selection of the hen of high egg-laying powers at this season of the year, so is it equally essential to select the future breeding stock for the coming season, because, while the particular

characteristics and peculiar signs manifest themselves at this season, once the moulting period sets in during April and May even the experienced person would have difficulty in detecting those birds possessing high laying capacity.

In the selection of the breeding hen, only birds of good breed type and fair specimens as far as shape and size are concerned should be used. Good width of the back over the egg cluster and well developed, deep abdomens are most desirable to give room in the bird's body for the full development of the ovaries and oviduct, the egg-producing organs.

Another very important point is the full crop development in the front of the hen. While most good hens generally carry a reasonably full crop at all times, many of our birds carry this crop too high up, with the result that a bird of this nature has not the desired room in the body for the full development of the heart and lungs, two most essential organs in the maintenance of perfect health, strength, and constitution. It is very important for a strong athlete to be well developed in chest capacity, and it is equally so with the breeding hen.

The legs are usually short in the shank, well set apart to assist the bird to support the full, deep abdomen and give perfect balance. The bone of these legs should be flat, and this flatness in the bone of the side of the legs will be of similar nature to the bones throughout the body, further indicating strength and constitutional qualities. The beak will be strong and slightly curved in shape, and the bird active and alert. The comb should be smooth, soft and silky to the touch, although not too large; this smoothness of the comb indicates the quality and texture which will be similar in the skin throughout the body.

All the other good points mentioned regarding high productive capacity should also be present in the make-up of the desirable breeding hen.

Obituary

Mr. F. C. Brown

FOR many years Chief Poultry Instructor of the Department of Agriculture, Mr. F. C. Brown died in Wellington last month. With his death the poultry industry has lost one of its outstanding figures.

Mr. Brown was in charge of the poultry section at the Seacliff Mental Hospital in the 'eighties under the late Sir Truby King, under whom he received a good training in practical poultry-keeping. He considered that Sir Truby was one of the greatest poultry pioneers in New Zealand.

Mr. Brown joined the Department of Agriculture in 1902, and his first position was the temporary management of the Department's poultry station at Milton, Otago. He was then loaned to the Mental Hospitals Department, and was stationed for some time at the Porirua Mental Hospital. His duties took him to the Moumahaki, Burnham, and Ruakura poultry stations.

After being placed in charge of the Milton poultry station again, he was appointed as assistant poultry expert under Mr. D. D. Hyde, who was then chief poultry expert, and is still living in Wellington.

In 1904 Mr. Brown was loaned by the Department to an association at Blenheim which controlled the first egg-laying competition in the Dominion. This consisted of 100 pens of six birds each. All this was pioneer work. In the same year a competition was established in Christchurch of about 30 pens. This formed the basis of the present noted New Zealand Utility Poultry Club, which conducts extensive competitions at Papanui, Christchurch.

In 1906 Mr. Brown took charge of an extensive poultry exhibit at the Christchurch Exhibition. Two years later he visited Australia and brought back over 100 utility fowls of various breeds and varieties for the Department. Later he revisited Australia and brought back to New Zealand a large consignment of birds, the progeny of which were distributed throughout the Dominion.

When Mr. Hyde retired, Mr. Brown was made Poultry Instructor. In 1915, as the work had increased beyond his capacity to deal with it, the late Mr. C. J. C. Cussen was appointed his assistant, and Mr. Brown was appointed Chief Poultry Instructor. He retired in 1935.

He leaves a widow and two sons.

APIARY NOTES — *Continued from page 148*

in use. This tin was deep enough to cover the blade, and the water was kept hot by a small spirit lamp. This is satisfactory for the beginner, but care should be taken to give the knife a sharp shake to dislodge any water before beginning to uncap, as if water gets into the honey it is liable to cause it to ferment.

Fine-grain Honey

After the honey has settled for a day or two in the tank it should be carefully skimmed, removing all trace of froth or particles of wax that rise to the surface. If it is desired that the honey should set with that smooth, fine grain so desired by the consumer, some fine-grained honey will be required to act as a "starter." When the honey is well skimmed a few pounds of this "starter" is placed in a bucket with some of the extracted honey, and these are well mixed with a clean wooden stick or paddle. The mixture is then poured into the tank and thoroughly stirred into the main bulk of honey.

A good stirring should be given once a day until it begins to show signs of clouding, when it should be run off into containers. Care must be taken to run it off before it becomes too thick. After the containers are filled the lids should be secured at once and the honey left until firmly granulated before being moved any distance.

Show Honey

One of the best ways of advertising honey is to display samples of good honey at shows.

Those who contemplate entering their honey for competition at shows should not leave its preparation until the last minute. For the granulated class the best quality should be placed in glass jars as soon as it is properly strained and ready for packing. A small starter of practically grainless honey should be stirred in, and the jars left in a cool place to granulate. Honey which has been taken from granulated bulk honey can rarely be conditioned to gain a prize.

—G. V. WESTBROOKE, Apiary Instructor, Hastings.

N.Z. Federation of Young Farmers' Clubs

Edited by S. Freeman, Dominion Organizing Secretary

National Stock Judging Contest

S. R. WHYTE, Hon. Secretary, Otago-Southland Council.

WHEN the National Stock Judging Contest for Y.F.C. members was entrusted to the Otago-Southland Council it was decided that every effort would be made to see that it was a success. With the outbreak of war came a general feeling of confusion and uncertainty. It appeared as if the contest would have to be abandoned, or at least considerably modified.

However, the statement issued by the September meeting of the Dominion Executive asking that the major activities already in train should be proceeded with cleared the air considerably, and the Otago-Southland Council settled down to make the contest an important feature of the Royal Show at Invercargill. Nevertheless, it was felt that it was doubtful whether much support could be expected from councils and districts whose teams would have long distances to travel to the contest. As a result, and with the permission of Dominion Headquarters, it was decided to invite entries from club teams as well as district teams.

Above.—Judging the Clydesdale horses.

Left.—The parade of dairy cattle for the judging.

Judging the beef cattle.

Good Entries

No fewer than 16 teams were entered, of which one came from Manawatu District Commitee, one from Wairarapa, one from Christchurch, and one from South Canterbury. In the individual championships there were 220 entries from 105 Young Farmers. Auckland was represented by Cliff Riddell, of Te Puke, who incidentally got into the money in the dairy cattle class by being second prize-winner.

The contest began on Wednesday, December 13, in brilliant weather and with plenty of support and enthusiasm. No serious hitches occurred, and the six classes, some of which attracted 54 entries, were completed by 4.30 p.m.

Results

The following are the prize-winners, and the congratulations of the Otago-Southland Council are extended to them for their excellent performances, whether as teams or individuals:—

Romney Rams.—A. Gardyne (Waikaka Y.F.C.), 1; H. G. Stephens (Christchurch District Committee), 2; E. Withell (Hinds Y.F.C.), 3.

Southdown Rams.—E. Withell (Hinds Y.F.C.), 1; M. Brooks (Christchurch District Committee), 2; A. McKenzie (Hinds Y.F.C.), 3.

Dairy Cattle.—D. Hurford (Christchurch District Committee), 1; Cliff Riddell (Te Puke), 2; W. Barron (Woodlands Y.F.C.), 3.

Beef Cattle.—G. Blatchford (Wairarapa District Committee), 1; Ross Henderson (South Taieri Y.F.C.), 2; W. R. Kofoed (South Taieri Y.F.C.), 3.

Clydesdale Horses.—G. Blatchford (Wairarapa District Committee), 1; F. Robertson (Drummond Y.F.C.), 2; D. Hurford (Christchurch District Committee), 3.

Baconer Pigs.—L. L. Christie (Warepa Y.F.C.), 1; H. McKenzie (Wairarapa District Committee), 2; Ross Henderson (South Taieri Y.F.C.), 3.

Teams Championship. — Wairarapa District Committee, 1; Christchurch District Committee, 2; Hinds Y.F.C., 3.

Entertainment

Because of the number of counter-attractions it was not possible to arrange all the entertainment that this council would have liked, but a very pleasant conversazione was held in conjunction with the final of the South Island debating contest between a South Canterbury team and the Otama team. The chairman of the council, Mr. A. C. Cameron, was responsible for the success of this function.

Judging the sheep in the pens.

Thanks

It would be impossible to mention any individual, as so many co-operated, not the least of whom were the competitors themselves, who were on time for the judging of all classes and did their part to make the contest the success it was.

However, this report would be incomplete if mention were not made of the various breed societies who kindly donated trophies, to the Dominion Executive for the championship team's trophy, and to the Southland A. and P. Association for its assistance both monetary and in providing such excellent facilities for the conduct of the contest. The council is also grateful to the North Island and Canterbury teams for lending their support and adding additional interest by their attendance.

Conclusion

Lessons which will prove valuable in future contests have been learned, but the Otago-Southland Council considers that it is entitled to feel gratified at the way the contest was carried out, and looks forward to being entrusted again in the future when and where major activities of the Y.F.C. Movement are carried out.

Otama Team Wins South Island Debating Contest

THE final of the South Island Debating Contest was held at Invercargill during Royal Show Week in the evening following the Y.F.C. Stock Judging Championships on Wednesday, December 13. The occasion was a consersazione arranged in honour of the visiting Young Farmers, and there was a large audience, Mr. A. C. Cameron, Chairman of the Otago-Southland Y.F.C. Council, being in the chair. Following the debate, many tributes were paid to the Young Farmers' Club movement, and speakers commented on the excellence of the standard attained by the members in both the stock judging contests and the debate.

Elimination contests held previously had resulted in the South Canterbury team and the Otama Club team being selected to represent the Canterbury and Otago-Southland Councils respectively. The teams were as follows:—South Canterbury: N. Wilson (leader), J. Barclay, and Cyril Whatman. Otama: S. A. Mackay (leader), L. G. Mackay, and E. E. Cameron.

The subject for the final debate was rather difficult, "That Environment has a Greater General Influence Than Heredity," but both sides gave very creditable performances, the Otama team taking the affirmative and the South Canterbury team the negative. The contest was won by the Otama team with 237 points, against South Canterbury's 225 points. The judge was Mr. A. J. Deaker, of the staff of the Southland Boys' High School, who is a well-known debating judge in Invercargill.

In winning this contest the Otama team becomes the champion Y.F.C. debating team of the South Island. An endeavour is to be made in the near future to arrange for a National Y.F.C. Debating Championship, which will be contested by the Otama team representing the South Island, and the Apiti team representing the North Island.

Results of Dairy Cow Judging Competition

THE results of the Dairy Cow Judging Competition conducted through these pages by means of photographs of animals ("Journal of Agriculture," August, 1939) are now to hand. The delay has been caused by the fact that, doubtless because of war conditions, the competition was not very well supported, and it was found necessary to extend the closing date. As it was, only 114 entries were received. The entry fee of 1/- each realised the sum of only £5 14s., the balance of £1 16s. being paid by the Levin Club, which sponsored the competition and guaranteed a minimum amount of £7 10s. as prize money.

The awards are as follows:—

No. 38, D. T. Lynch, Linton Y.F.C., and No. 54, F. Garnett, Alton Y.F.C., 110 points, tie for first; No. 65, B. R. Neels, Waimana Y.F.C., 109 points, third.

D. T. Lynch and F. Garnett divide the first and second prizes, £5 and £2, between them, and B. R. Neels receives the third prize of 10s. An exceptionally good card was sent in by the Rangiora High School, scoring 135 points out of a possible 180, but as this was a combined effort it was not eligible for the competition. In recognition, however, of the very creditable performance, a special award of £1 has been made by the Dominion Executive.

Of the 114 competitors, 101 were club members, the remaining 13 being non-members whom, it is hoped, will be attracted to the Y.F.C. movement.

Judge's Comments

Mr. Thos. Ranford, the well-known Jersey breeder, who kindly judged the competition, placed the cows in the following order of merit;—Nos. 2, 4, 5, 6, 1, and 3, and has submitted the following report:—

"I would like to express my delight at the splendid performance of the competitors, and with one exception they all showed a good knowledge of what to look for in a good dairy beast.

"It became a little harder to apply the knowledge rightly, but the majority did very well indeed. The animals in the class were well chosen, the first three placed by me gaining their honours on constitution and good capacity, plus refinement and fineness of bone and skin, which we look for in our best breed cows and performers. The winners kept this well in mind when choosing their animals, and gave excellent reasons for their placings.

"Some competitors had the knowledge but not the eye, showing need of more training in quick selection. Some entered thinking they might just strike a win (at least, that is how I took it), and some entered for fun.

"Some were caught out with a large vessel, forgetting even proportions, and again others went for straight outline. This latter point is very desirable in a breed or dairy animal, all other points being equal, but should never come first in itself. No. 1 cow illustrates this point; as I see her, she has good lines, but is gross, lacks body, and has an inclination to roundness of bone with this. No. 3 caught a few, who described her as very fine. In this case the difference comes in between fineness and weakness, and to me she inclines to the latter in every way.

"No. 6 troubled some, but this cow, although attractive in appearance, is too shallow, again showing a sign of weakness or lack of constitution so necessary for heavy production. No. 5, with her large vessel and deep body, scored high with some who overlooked her shortness and uneven proportion; she also appealed to me as slightly high on the leg, but an excellent cow otherwise.

"The tail-finish of No. 4 seemed to worry others; to me she has a good tail-finish, but was caught by the camera holding it up. This cow has beautiful bone and skin, good length of body, a true wedge shape, and good capacity of udder. Although from appearance not so well caught as some of the others, she is alert; the head being slightly turned gives her neck an appearance of thickness, but, take her right through, she appeals as a very desirable type of animal for both dairy and breed.

"No. 2 pleased most, but her top line worried some, who described her as a hollow-backed animal. To me, she is not weak in the back or loin, but exaggerated in the tail-finish, which, however, is not coarse but fine. Taking her right through, I see in her all those points which we look for in the ideal dairy and breed cow, with the one weak point as described above.

"Allow me to congratulate the competitors on their fine work."

Y.F.C. Members And Overseas Service

Advice has been received of quite a number of Y.F.C. members who have joined up for overseas service with the New Zealand forces.

It is of interest to note that the Dominion President, Mr. E. W. Barnett, who had offered his services on the outbreak of war, was called up in December as a Pilot Instructor, and is at present stationed at the Flying Instructors' School, R.N.Z.A.F., Mangere, while Mr. D. F. Coleman, Dominion Vice-President, went into camp at Burnham during January.

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Geraldine Club's Field Day

J. A. THATCHER, Hon. Secretary, Geraldine Club.

THE first field day organised by the Geraldine Young Farmers' Club was held in the Geraldine district on November 30, 1939. More than 50 attended, including Young Farmers, members of the Geraldine branch of the Farmers' Union, and pupils attending the agricultural course at the Geraldine District High School.

In the morning a visit was made to the farm of Mr. J. Crotty in Sercombe's Road to inspect the five breeds of sheep kept there, namely, Southdown, English Leicester, Romney, Border Leicester, Ryeland. Using the Southdown and Romney, Mr. Alan Grant, stud stock breeder of Waimate, explained the special value of these breeds for use in the frozen meat trade, and especially pointed out the many points which characterise them.

Inspecting the up-to-date piggery during the Geraldine Club's field day.

Sheep Judging

A special sheep-judging competition on Southdown ram hoggets, in which Young Farmers and agricultural students took part, was won by G. Sheed, Geraldine Club, with A. Crotty, agricultural student, second, and R. Hammond, Geraldine Club, third. Mr. Grant, who judged the competition, said Sheed's placings were correct and Crotty was only one point out.

The afternoon session was held on the farm of Mr. S. R. Muff, of Orari, where Mr. E. J. Lukey, B.V.Sc., demonstrated on dairy types, using Mr. Muff's fine Friesian cattle. This lecture was supplemented by an address by Mr. Muff, who outlined the many advantages to be derived from herd testing and sire recording. Mr. Muff, who is an ardent supporter of this practice, backed up his many arguments with substantial evidence of the amazing results he had obtained.

Great interest was displayed in the extensive and up-to-date piggery which was the scene of the next lecture, which was given by Mr. D. Urquhart, Inspector of Stock. Mr. Urquhart particularly stressed the special points of the Red Tamworth, and the qualities farmers should seek when purchasing these animals.

Ideal Pastures

A visit was then paid to Mr. Muff's pastures, which gave a fine illustration of the value of soil analysing and top-dressing with lime and super. The inspection was accompanied by a talk on the ideal pastures, pasture mixtures, and pasture management by Mr. C. C. Leitch, Department of Agriculture. The many advantages which the electric fence holds over its predecessors was amply shown in an address and demonstration given by Mr. Douglas Muff, a club member.

This was the concluding demonstration, and Mr. V. Stonyer, club chairman, thanked Messrs. Grant, Lukey, Leitch, and Urquhart for their fine lectures, and more especially Messrs. Muff and Crotty for placing at our disposal their stock and properties for inspection.

The arrangements for the day were carried out by a special committee consisting of V. Stonyer, chairman; J. Thatcher, secretary; W. Crotty, advisory president; E. N. J. Hannah (High School Agricultural Instructor), and H. Worner.

Cheviot Club's First Field Day

A. MOWAT, Hon. Secretary, Cheviot Club.

THERE was a large attendance at the Cheviot Y.F.C. field day recently, which was the first field day to be organised by this club. Young Farmers of the district and from the Omihi-Scargill Club, and also members of the Farmers' Union, gathered at the Sloss Estate, "Leamington Downs."

After being entertained to morning tea, the visitors inspected Ryeland and Southdown sheep, following which a field of Cross 7 wheat was inspected, and Mr. A. S. Nash, Department of Agriculture, explained the breeding and certification of the wheat. He also dealt with loose smut and stinking smut and preventive measures.

After inspecting a field of peas and an excellent one-year-old pasture the party proceeded to Mr. J. Beckett's farm, where a demonstration was given by Mr. D. MacDonald, Amberley, on "Fat Lambs and How to Handle Them," and the points in knowing when a lamb is "fat." He also demonstrated the points of judging Southdown, Corriedale, and English Leicester sheep.

This was followed by a demonstration on the characteristic points of Clydesdale horses by Mr. J. Wyllie, Omihi, a prominent breeder of Clydesdales. An inspection was made of a seed paddock of certified ryegrass, on which was an exceptionally good crop.

In the afternoon Mr. J. B. Stevenson's farm was visited and an inspection made of a crop of Marquis wheat. A pasture was then inspected which ranked first in the district for the spring pasture competition, and Mr. Nash pointed out its make-up and manurial treatment, and described it as being an ideal sheep grazing pasture. A most outstanding paddock of certified Italian ryegrass was also inspected, and an inspection of the farm and various crops followed.

A visit was then made to Mr. McPherson's farm, and an inspection made of some very old permanent pastures, still growing vigorously and containing a large proportion of the original pasture grasses. An inspection was also made of Mr. McPherson's woolshed and dipping yards, which are most up to date. This concluded a most interesting and instructive day.

In the evening a gathering was held in the Public Library, when Mr. A. S. Nash gave a review of the judging of the district spring pasture competition to a large attendance consisting of Young Farmers and members of the Farmers' Union.

Stock Judging Competitions For North Auckland Clubs

IAN D. BODLE, Matarau Club.

A YOUNG Farmers' Club stock judging competition is to be held at the Whangarei A. and P. Society's Centennial Autumn Show during the afternoon of the first day of the show, March 8, 1940.

The generosity of the A. and P. Society, farmers' organisations, and individuals keenly interested in our movement has enabled the Whangarei District Committee of Young Farmers' Clubs to initiate a competition which should attract members from all Clubs in the North.

Although several details have yet to be finalised, it can be stated with authority that the competitions will be as follows:—

Dairy Cattle.

(a) To judge four or five Jersey cows. First and second prizes.

(b) Club teams of three, one member to be under 21 years of age. (Clubs may enter more than one team.) First prize.

Bacon Pigs.

(c) To judge four or five bacon pigs "on the hoof." First and second prizes.

(d) Club teams of three, one member to be under 21 years of age. (Clubs may enter more than one team.) First prize.

General.

(e) Prize for competitor securing most points in classes (a) and (c).

(f) and (g) Two classes the same as (a) and (c) open only to Young Farmers' Club members of 18 years and under, and pupils of agricultural section of the Whangarei High School. Certificates from A. and P. Society.

(h) The Supervisor of the Northland Pig Council may co-operate with us in arranging a Bacon Pig Judging Competition for **members of Pig Clubs only.**

Entrance fees are required only for classes (a) and (c). The entrance fee is 6d each class.

Competitors must accept the decisions of the judicial committee, which will check the total points gained by each competitor.

Entries will be accepted until 12 o'clock on March 8, but members are requested to advise the secretary of Whangarei District Committee of Young Farmers' Clubs how many competitors are coming from each club as soon as possible.

It should not be necessary to emphasise that observation is the best foundation of practical education, and that Young Farmers' Club competitions are doing excellent work in this direction.

As the Whangarei A. and P. Society's Stock Judging Competition for Young Farmers has been generously supported by friends of the movement, it is to be hoped that members throughout the North will endeavour to do their part by entering wholeheartedly into these competitions if they can possibly be in Whangarei at the time.

Waihaorunga Club's Field Day

H. A. BROWN, Hon. Secretary, Waihaorunga Club.

A SUCCESSFUL field day was held by the Waihaorunga Club in November, 28 members and 18 visitors being present. A start was made at 10.30 a.m. on the property of Mr. W. Armstrong, Waihaorunga, when an inspection was made of 60 experimental plots of various grass and clover mixtures sown by club members two years previously. Mr. C. C. Leitch, Department of Agriculture, demonstrated on the strains and seed mixtures, and it was clearly shown that New Zealand-grown seed was far superior to imported seed, and that high-grade seeds resulted in more lasting pastures than those sown with seeds of inferior quality.

At the conclusion of Mr. Leitch's demonstration a visit was paid to Mr. Syd Hurst's farm, where lunch was waiting. After lunch the party went on a tour of Mr. Hurst's farm in cars, stopping here and there for Mr. Leitch and Mr. Hurst to discuss the various pasture mixtures and to demonstrate the effects of topdressing, etc.

Members showed keen interest in Mr. Hurst's private lime-crushing plant on Mr. J. Bell's property, and also in the irrigation dam being built by Mr. Hurst on his own property. Mr. Hurst explained his projected scheme, and showed how he had already proved the value of irrigation on that type of soil. After inspection of further points of interest the party returned to the

homestead, where Mrs. Hurst and lady helpers had prepared refreshments.

Mr. Bruce Armstrong, vice-chairman of the club, thanked Messrs. Armstrong and Hurst for the use of their properties for the field day, and Mr. Leitch for the able manner in which he had explained the various points in regard to the pastures, etc. He also thanked Mr. Syd Hurst and Mr. and Mrs. Allan Hurst for the hospitality they had extended to the party generally. The day had proved most instructive and interesting, he said, and club members and their friends had thoroughly enjoyed themselves.

Sides were then picked for a friendly cricket match, in which the "Roughs" beat the "Toughs" by 43 runs to 37.

In the evening two debates were held with members of the Waihaorunga Women's Institute, bringing a very enjoyable and informative day to a close.

Afternoon tea adjournment at Mr. S. Hurst's homestead. The ladies who helped with the catering are in the foreground.

Among the Clubs: Reports on Activities

Christchurch.

Ellesmere.—Congratulations were extended to club members successful at the National Stock Judging Competitions. The competitors securing places were H. G. Stephens (2nd in Romneys), M. Brooks (2nd in Southdowns), and D. Hurford (1st in Dairy Cattle and 3rd in Clydesdales). The above were also members of the Christchurch team which gained 2nd place in the teams event. An address entitled "Some Aspects of Grassland Cultivation and Management" was given by Mr. R. H. Bevan, Lincoln College.

West Melton.—This was an open meeting, several members of the Farmers' Union and their wives being present. The resignation of P. Ashwell, club treasurer, was received. Messrs. Gough, Gough, and Hamer, Ltd., Christchurch, gave a motion picture display featuring tractors and their value to farming and other industries in U.S.A.

Wairarapa.

Martinborough.—General business, followed by a discussion on club affairs.

Manawatu.

Apiti.—Election of committee to organise club show to be held in March. General discussion on matters in connection with this show.

Opiki.—Decision to raise funds by means of a raffle. A short address on "Sporting Activities" and a motion picture display was presented by Mr. H. de O. Chamberlain, Department of Agriculture. At a previous unreported meeting various club members gave six-minute speeches:—R. Vile, "Electric Fences"; J. Young, "Panama Canal"; D. Young, "Eradication of Blackberry"; J. Paget, "Stumping"; C. Phillips, "Ensilage"; A. Young, "Value of Trees"; G. Makeham, "Farm v. City Life"; E. Vile, "Scilly Islands."

Oroua Downs.—A lecture entitled "Certification of Ryegrass" was given by Mr. L. Earl, Department of Agriculture.

Otaki-Te Horo.—Talk by Mr. S. McNichol, Department of Internal Affairs, on "Physical Fitness." At a previous meeting Mr. M. C. Holmes spoke on "Impressions of Farming Abroad."

Tokomaru.—Arrangements for club dance. Lecture by Messrs. Nielson and Peirson, the subject being "Pigs, Cattle, and Sheep."

Wanganui.

Waimarino.—Arrangements for Y.F.C. stock judging at local show. Proposed South Island tour discussed.

South Taranaki.

Alton.—Report by club's delegate on the meeting of the Red Cross held recently. Mr. J. E. Davies spoke on "Co-operative Farming."

Hawera.—Lecture by Mr. F. Bone on his recent visit to Great Britain and Scandinavia.

Kaponga.—General business. Each member present gave his views on "The Wintering of Pigs."

Central Hawke's Bay.

Onga Onga.—Arrangements made to hold a field day. Mr. E. S. Bibby, advisory president, reported on the Primary Production meeting held in Waipukurau. Proposed to seek the co-operation of the Farmers' Union in an endeavour to teach young farmers to shear. Decided to send a letter to Mr. H. S. M. Quigley asking for information as to the progress made by the promoters of a Land Settlement Scheme.

Poverty Bay.

Gisborne.—General business. Dr. Bowie addressed the meeting on "Social Diseases."

Tolaga Bay.—General. Talks by club members as follows:—T. Craill, "Trapping Opossums"; S. Smith, "Ploughing"; O. James, "A Magneto." At a previous meeting Mr. Phillips spoke on "A Tour Through Europe."

Te Kuiti.

Te Anga Central.—Arrangements for annual dance. General discussion on potato-growing competition.

Western Bay of Plenty.

Kati Kati.—Business meeting.

Pukehina.—General business, Mr. J. B. Cawie gave a short talk on "The Correct Manner of Conducting a Meeting." A lantern display featuring "Seed Certification" was then presented by Mr. A. V. Allo, Department of Agriculture. A field day was held on Mr. J. Pattie's property. There were 24 present, eight of whom were visitors. Opening speeches were made by D. Shearer, club chairman. The demonstrations included "Jersey Cow" (W. Riddell), "Draught Horse" (B. Broom and M. Marsh), "Bacon Pig" (D. S. Ross).

Paengaroa.—Arranged to hold a club dance. Five members were transferred to the newly-formed Pukehina Club. An address by W. W. Johnson, who gave an account of his voyage from England.

Tauriko.—General business. Mr. A. V. Allo gave a lantern lecture on "Grass and Clover Certification."

Waikato.

Cambridge.—General business. A study was made of the Palomar Mountain telescope. Field day held at Ruakura Farm of Instruction. There were 32 present, including 17 visitors. Messrs. T. E. Rodda and E. M. Ojala, Department of Agriculture, made the opening speeches, and the demonstrations included the following:—"Aberdeen Angus Cattle" (Mr. T. E. Rodda), "General Experiments" (Mr. E. M. Ojala), "Dairy Farm" (Mr. E. R. Marryatt), "Sterility in Bulls" (Mr. S. A. Southcombe), "Pig Experiments" (Mr. J. H. Hitchcock).

Hauraki.—Discussed debating contest rules. Mr. J. W. Epps spoke on "Herd Testing," Mr. Townsend on "Jersey Cattle, Their Origin and Place in New Zealand Today," and Mr. Cheale gave a talk entitled "Pigs and Their Management."

Huntly West.—General business.

Auckland.

Clevedon.—Arrangements for field day. Discussion on inter-club competitions and visits, and also on the district court at the Hamilton Winter Show. A talk entitled "The Control of Noxious Weeds" was delivered by Mr. J. E. Bell, Department of Agriculture. At a previous meeting the final series of talks dealing with grassland farming were given by Messrs. Bell, Lane, Paul, and Burgoyne, the subject on this occasion being "Handling of Pasture."

Harrisville.—General business. Two interesting talks were given by Mr. L. G. Morris, dairy factory manager, on "Butter Manufacture" and "Feed Flavours."

Mangatawhiri.—Arrangements for club dance. Decided to support the A. & P. Association, and several members offered their services as stewards at the forthcoming show.

Whangarei.

Keri Keri.—General business. Mr. P. Everett, Department of Agriculture, lectured on "Cross-pollinations and Budding." This was followed by an open discussion on the agricultural films displayed recently by Mr. S. Freeman. Y.F.C. Organising Secretary, and Mr. E. B. Glanville, District Secretary.

Health Notes for the Farm

Contributed by the Department of Health

Health From Sunlight

THE value of sunlight as a health-giving agent has been recognised since very early times. There are evidences that the ancient Egyptians knew something of the therapeutic value of the sun's rays. With the growth of large towns and the artificial conditions imposed by the conventions where people have congregated together, possibly this ancient knowledge lost some of its significance if we are to judge by the narrow streets and cramped window space which we find in the older towns, but in modern times sunlight has regained its true place as one of the greatest gifts Nature provides.

How To Obtain The Most Benefit From a Sun-bath

Thus we find during the last half-century that various laws and regulations were enacted to combat the over-commercialisation of space and light in our towns, and to compel the builder to provide windows of a size commensurate with the space to be provided with light. Our grandparents learned the value to their children of periodic trips to the seaside or country. More recently still, the importance of clothing permitting the action of the sun upon the skin has been realised. This reaction affects the blood, and results in an increase of those accessory factors which encourage growth and are antagonistic to certain constitutional diseases of childhood.

Thus, in childhood especially, the benefit of suitable clothing may be expected. The common-sense costume which parents of this country have adopted for their children has contributed to a more satisfactory

standard of physical health among New Zealand children.

Source of Rickets

In countries where there is not much sunlight, and especially where children are living in dark streets of big cities, they often develop a condition of badly-formed bones and teeth—a disease called rickets, a disease which, in its grosser manifestations, is practically non-existent in this country. In England during the last century, under the pall of smoke which hangs over great industrial centres, men, women, and children languished from sunlight starvation, and the march of rickets and of tuberculosis kept pace with the march of industrialism. It is our duty, therefore, to prevent from ever arising in this country those deplorable atmospheric conditions under which large populations live in older countries.

Those who work in the clean air of the fields live long. On the other hand, those who are confined in dark places or who constantly work away from daylight become pale, and tend to lose their normal healthy vigour.

There is now an accumulation of evidence to show the benefit to be derived from sunlit air, especially in conditions such as faulty nutrition and tuberculosis, and this method of treatment is being used in Great Britain, the Continent of Europe, and America. It is reasonable to conclude that a sun-bath or even an air-bath can materially contribute to the well-being of average people who do not suffer from any particular complaint. To obtain good results a proper procedure must be followed. Take the sun-bath as follows.

How to Take A Sun-bath

Early morning is the best time, and it should be taken in an open space and not through glass. Benefit comes partly from cool air acting on the skin. The head, the back of the neck, and the eyes should be protected by a large sun hat and goggles. Sunburn should be avoided, as it can be very harmful; aim at tanning.

Begin with a small dose, noting the reaction some six to twelve hours later, when sunburn becomes apparent. Gradually increase the time, exposing large areas of the body. When pigmentation (browning) is obtained, usually after a few exposures, the time may safely be lengthened. If sunburn occurs the following treatment is recommended.

For mild cases use calomine lotion, and for more severe cases a tannic acid preparation. Blonde and red-haired people, as a rule, show greater sensitiveness to sunligh, and the slightest over-exposure may react unfavourably, producing fatigue, lassitude, irritability, fever, nausea, or headache. A feeling of well-being should accompany and follow the sun-bath.

A safe procedure would be as follows:—

First Day.—Five minutes. Expose the arms and legs to the fullest extent, giving half the time to the front and half to the back.

Second Day.—Ten minutes. Five minutes for the arms and legs as before, and five minutes to the whole body, front and back.

Third Day.—Fifteen minutes. Whole body. Divide the time equally back and front.

Increase daily by five minutes up to the maximum of one hour.

To Prevent Sunburn

It is inadvisable for delicate children, convalescents, the aged, and those with active disease to sun bathe except under medical supervision. The very old, the very young, and the very debilitated burn much more readily. Very small children should be allowed to run about in the sun for only a few minutes the first day, and then the period can be gradually increased daily, but such children need carefully watching to prevent sunburn.

It cannot be too strongly emphasised that prolonged reckless exposure of the body to bright sunlight may be very harmful, particularly to the nervous system of a child. Over-exposure, over-fatigue, and want of sleep will lower a child's resistance to infectious disease. When children play in the sun they should wear shady hats.

A vegetable oil is excellent for rubbing into the sensitive skins before sunbathing on the beaches; the oil reflects sunlight from the skin.

The primary function of the pigment obtained by sunlight bathing is to arrest an excess of sunlight, which has a lethal effect. This is shown by the fact that—(1) the blackest races are to be found in dry, sunny, climates with much sun-glare from the ground; (2) dwellers in the arctic snows are pigmented; (3) whites exposed to direct sunlight or snow-glare are sunburned and pigmented. After pigmentation they become immune to sunburn

Air-bath

The action of cool air upon the skin is very beneficial, and occurs in the shade as well as in the sun. Once one is accustomed to exposure to sun and air (in the sun-bath) the period of air-bathing may be gradually extended; for example, wearing bathing suits turned down to waist, trunks, or shorts. Here, again, the response must be studied. There should be no shivering. The skin should feel warm if the reaction is right.

We have sometimes been apt to fear sunlight rather than to welcome it, to think of the power of the sun to fade carpets and curtains rather than to recognise that it gives health and vigour to the body if proper precautions are observed. We all feel more cheerful on a sunny day than we do when the rain is falling and the skies are grey and forbidding. Surely, then, it is only sensible to make the most of our opportunities and to take double doses of Nature's most delightful medicine.

Other conditions being equal, life lived in the open air and sunshine makes stronger men and women than life lived indoors. Many men and women of uncivilised peoples have a fine physique. Their diet is of the simplest and they have few amenities of civilisation, but they live a natural life in the open air and sunlight.

Social Factor

According to Dr. Rollier, of Leysin, an eminent advocate of sun treatment: "Applied to childhood, the sun cure will become a paramount factor socially, because it can pave the way for generations physically and mentally healthier and stronger than our own. To prevent their young bodies becoming a favourite ground for the development of disease, we must give an increasingly large place to air and sunshine in the lives of our children. All of us need sunshine and fresh air as well as food. Good food we can buy. Fresh air and sunshine Nature has abundantly provided. Let us use them that life may be fuller and happier."

The Farm Home and Kitchen

Contributed by the Association for Country Education

Is Marriage a Skilled Profession?

TO realise the significance of classing marriage as a profession one needs to remember the general standards which distinguish between a professional and a non-professional occupation. While all labour has dignity, we accord to the professional occupations a still greater degree of respect, because we expect a person who is engaged in a profession to have given many years of his life to securing special training and qualifications in respect of that science or art, and to follow the highest standards in his professional and his personal life. Our respect increases accordingly as the profession calls for self-sacrifice and serves to augment the happiness and welfare of mankind.

Mother's Responsibility

When we consider what qualifications marriage possesses to be ranked as a profession we find that, while the curing of disease calls for the services of professional men and women who have gone through long training to perfect their knowledge of the human body and their skill in diagnosing complaints and treating them, there is practically no scientific training provided for the more important responsibility of bringing healthy children into the world, of developing in them bodies that are robust and vital, and of inculcating habits of right living.

The doctor and the nurse pass examinations before they are allowed to take the responsibility for treating patients, but there is no standard of knowledge required before a woman may become a mother.

Again, take the school teaching. This ranks as a profession, but its influence on the future citizen is really of far less strength than the training which the child receives at home. If, thanks to the mother's training, the home turns out children who are industrious, observant, eager to learn, friendly, sociable, helpful, self-controlled, and truthful, it is a simple matter for the school master to do his share in producing enlightened, progressive, and honourable citizens. The teacher has years of training to prepare him for his part of the work, while the mother is expected to "know by instinct" how to deal with her child. So, again, it is obvious that it is not lack of importance but lack of training which prevents marriage from being ranked as a profession.

Home As Consumer

Nor must we forget the importance of the home as the great consumer of commodities, and the power over industry and production exercised by the thousands of women who are the selectors and purchasers of practically all household commodities. The woman is the purchaser whose demands and needs control the majority of industries. But in most countries of the world women are given no opportunity to secure training in consumer education; there is no banding together into professional homemakers' associations, and no setting of standards by such associations.

In some countries, however, the importance of the woman's work in the home has long received general recognition, and thorough and scientific training in all departments of homemaking has been provided. American women are adopting a professional attitude towards it, and the "housemother" schools through Scandinavia, for instance, provide a residential course of not less than six months' duration for girls between 15 and 20 years of age. Practically every girl attends these schools in addition to passing through the primary schools, in which home science is a compulsory subject.

So important is this training considered in Denmark that when a girl is engaged to be married and cannot afford to attend a course, the Government will pay for her to take a three months' course in home care, child care, food values, budgeting and buying, and dressmaking. The older women, through their housewives' organisations, employ qualified home science teachers to advise them on the latest and most scientific aspects of home management in all its branches. The result is that home-making is a much respected occupation, looked up to by the community as a whole.

Respected Occupation

For marriage to be classed as a skilled profession is a very natural sequel to the years of progress and development that have passed.

If our New Zealand women feel the desirability of securing in this country a similar standing for home-making, I am certain that by their home efforts and the co-operation of the Home Science Department of the University of Otago and the Association for Country Education they will be able to bring it about.

—*V. MACMILLAN, B.H.Sc.*

"Junior Homemakers"—Who Are They?

EVERYONE knows that the "Young Farmers' Clubs" provide opportunities for the future farmers of New Zealand to meet, discuss, and learn, and otherwise to prepare themselves for their vocation as primary producers. But everyone does not know that the Junior Homemakers' Clubs, sponsored by the A.C.E., similarly enable the prospective housekeepers, wives, and mothers in the country districts to equip themselves, mentally and physically, for their future calling.

Do You Know?

That citrus fruits, such as oranges and grapefruit, are judged by their heaviness and smoothness of skin.

That fresh pineapple should be firm but not hard, the spines should pull out easily, and there should be a decided, characteristic odour.

That bananas should be solid, but speckled with numerous brown spots.

That cabbage should be solid, crisp and green, while cauliflower should be creamy white with no discolouration, solid, and compactly formed.

Girls between the ages of 15 and 25 years are eligible as members. They select a goal as their year's project, and each month an A.C.E. tutor gives them a lecture-demonstration which takes them a step nearer to the achievement of the goal. In addition, they are given training in how to run a business meeting, and are given opportunities to acquire useful hobbies and general interests. Besides the monthly meeting, a five-day rally and short course in Dunedin are also included in the year's tuition. Two members of each club are entitled to attend the rally, which is held by arrangement with the University of Otago in one of the Home Science Hostels.

The bulk of work in the hostel, such as cleaning rooms, etc., is carried out by the delegates, who are divided into groups and carry through all duties in rotation. Each day the time from 9.30 a.m. to 12.30 p.m., and from 2 p.m. to 5 p.m., is filled with discussions, demonstrations, lectures, etc. The main theme of this year's rally was centred around the selection, preparation, and care of food to ensure that every family and every member of every family could be properly fed according to his or her age and needs. In the evenings "fireside evenings" are the usual activities, and informal talks or entertainments are given by inspiring personalities.

The following report submitted by the president of a J.H.C. will enable one to judge the interest which the J.H.C. girls take in their club programme, their home projects, and their rally activities.

Annual Report of J.H. Club

"The first meeting was held in March, 1939. The ten girls present decided to form a J.H. Club. The topic chosen for study was a personal one, namely, "My Own Wardrobe and Future Plans." During the year we have discussed the minimum wardrobe; colour schemes to suit each girl; what money we'll have to spend next year; and how to spend it; importance of line in clothes designing; posture; how to test the qualities of material; accessories; their importance and place; and lastly "Spring Cleaning Your Clothes." During recreation periods we had play-reading, cutting and making skin gloves, and making felt posies.

"A dance was held to raise funds for the club, and was voted the best ever held in the district. A large crowd attended, and we cleared £10. We catered ourselves, and the supper was really a worth-while effort, as it delighted our guests, and under the guidance of our tutor and our own supervisor, we found it entailed much less work than we expected, and it was perfectly carried out.

"Well, I must say that I have enjoyed the meetings every month, and the discussions with the tutors have been very helpful for planning our wardrobe for the future, and the glove-making and felt flowers demonstrations were very interesting to us all.

"During August, the rally was held at Dunedin, and I had the pleasure of attending it along with many other girls from Southland and Otago. We went for several interesting trips, one being to the new Karitane Hospital, which I enjoyed very much, one to the W.E.A. to see some plays, and a visit to the Home Science School.

"It is hard to single out anything that I liked more than the other, but I did find the talks given by Dr. Marion Whyte and Professor Strong very interesting, and also the talks by the tutors each morning about the food we eat.

"We all hope that the future rallies may be as enjoyable as the last, and that the girls roll up and make the most of the grand opportunity of meeting the girls from the different clubs."

—(Signed) J.H.C., PRESIDENT.

"In the past, science has conferred on those people who availed themselves of the newer knowledge of infectious diseases, better health and a greater average length of life. In the future, it promises to those races who will take advantage of the newer knowledge of nutrition a larger stature, greater vigour, increased longevity, and a higher level of cultural attainment. To a measurable degree, man is now master of his own destiny, where once he was subject only to the grim hand of Fate.' '

—JAMES S. McLESTER, M.D., Retiring President, American Medical Association.

AUTUMN CHUTNEY.

3lb apples.
1lb seedless raisins.
2lb tomatoes.
1lb brown sugar.
4 cups vinegar.
½ teaspoon cayenne pepper.
1 teaspoon pepper.
2 tablespoons salt.
2 teaspoons ground ginger.
1lb, onions.

Method.—Skin the tomatoes by pouring boiling water over them. Slice them into the pan. Mince apples and onions and add to the tomatoes together with the raisins, spices, and sugar. Stir and cook for twenty minutes. Add vinegar. Stir and boil one and a half to two hours until the chutney becomes thick. Taste, add more salt if required, and pour into clean, hot jars and cover at once.

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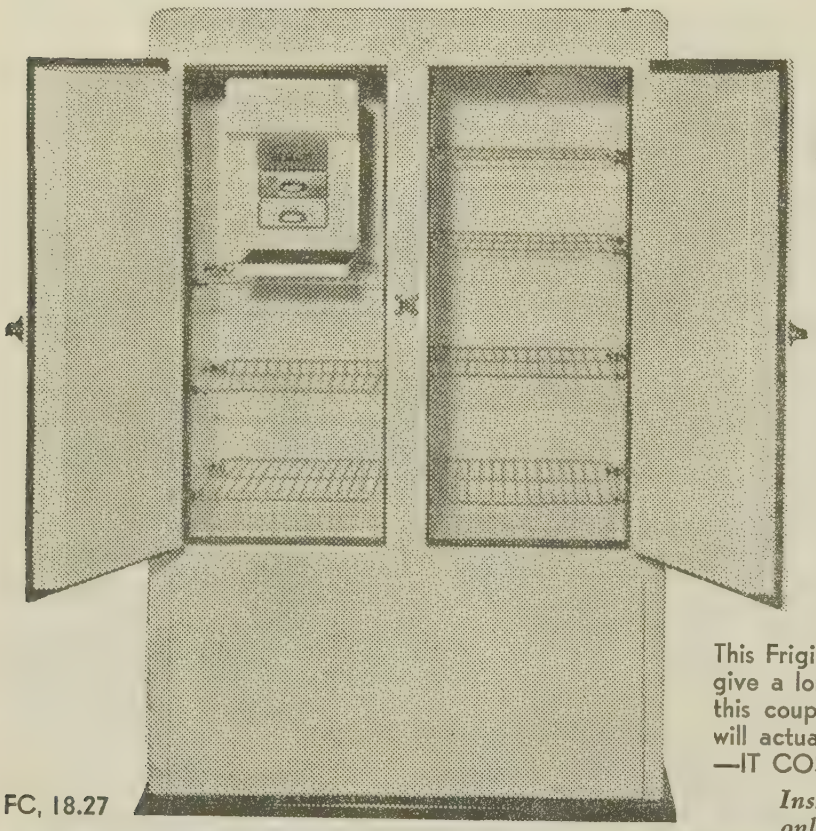

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*WHEATMEAL FRUIT CAKE.

½ lb. butter.
Peel and nuts to taste.
12 oz. wheatmeal.
1 lb. mixed fruit.
4 eggs well beaten.
10 oz. sugar.
¼ teaspoon cream of tartar.
¼ teaspoon of baking powder.
(No soda.)

Method.—Beat butter and sugar. Add eggs. Add fruit and essences. Lastly wheatmeal and cream of tartar and baking powder. Bake 1½ hours steadily at 325-350 deg. F.

*NUT SHORT CAKE.

1 lb. flour.
½ lb. butter.
½ lb. light brown sugar.
2 teaspoons spice.
2 teaspoons cinnamon.
2 teaspoons cream of tartar.
2 teaspoons soda.
2 eggs.

Method.—Work with hand to stiff paste and cut in half. Roll half and place on tray. Cover with jam and cover with second half. Brush with milk and cover with chopped nuts. Bake 20-30 minutes at 350 deg. F. Cut in fingers.

QUICK AND ECONOMICAL FRUIT CAKE.

1 lb. flour.
½ lb. butter.
½ lb. sugar.
1½ lb. fruit.
¼ lb. peel.
¾ cup milk.
3 eggs.
1 tablespoon syrup.
1 teaspoon soda.
Almonds.

Method.—Add soda and syrup to milk and heat slightly until dissolved. Rub butter into sifted flour (as scones). Add sugar and fruit, pour in milk, etc., and lastly add beaten eggs. Put in tin lined with greased paper and bake 2½ to three hours at 325 deg. dropping to 250 deg.

CHOCOLATE CAKE WITH RAISINS.

2 tablespoons cocoa.
4 oz. butter.
¾ cup walnuts.
1 cup milk.
1 teaspoon soda.
2 eggs.
8 oz. sugar.
1 cup seedless raisins.
8 oz. flour.
½ teaspoon cream of tartar.
1 teaspoon vanilla.
Pinch salt.

Method.—Cream butter and sugar and add the beaten eggs. Fold in sifted flour, cream of tartar, and salt, and add soda and milk, lastly fruit. Bake in sandwich tins at 400 deg. top off, bottom low, 30 minutes. When cold join together with chocolate filling and ice top.

N.B.—Instead of sandwich tins, one large tin may be used. Bake one hour.

WHOLEWHEAT PRUNE BREAD.

1 cup flour.
2½ cups whole wheat flour.
1 teaspoon salt.
4 teaspoons baking powder.
½ cup sugar.
1 egg.
1 tablespoon melted butter.
1¾ cups milk.
1 cup uncooked prunes.

Method.—Mix dry ingredients. Add prunes, which have been pitted and cut in small pieces. Add milk and slightly beaten egg. Beat well. Add melted butter. Turn into a well-buttered bread pan. Bake in a slow oven 325 deg. F. about 1 hour.

COCOANUT LOAF.

2 cups flour.
¾ cup cocoanut.
½ cup sugar.
2 teaspoons baking powder.
1 dessertspoon melted butter.
1 egg.
Pinch salt.
Enough milk to make right consistency—about ½ cup.
Bake in slow oven ¾ hour.

GINGER BREAD SPONGE.

½ lb. butter.
2 eggs.
½ packet allspice.
1 teaspoon ground ginger.
1 teaspoon soda.
½ lb. sugar.
¾ cup golden syrup.
1 tablespoon cinnamon.
1 cup milk.
1 lb. flour.

Method.—Cream butter and sugar. Add eggs and beat well. Add syrup, soda, dissolved in boiling water and milk. Mix well with flour. Bake 1½ hours.

GINGER APPLES.

Method.—Pare and core tart apples. Fill the cavity of each apple with a spoonful of preserved ginger. Place in a baking dish and add a syrup made of one cup of water and half cup of sugar, or some ginger syrup diluted with a little water. Bake until soft and transparent, but not broken. Baste several times with the syrup. Serve warm or cold.

PEACH COBBLER.

Peaches, 2lb.
Sugar, to taste.
Water, if necessary.
Flour, ¾lb.
Shortening, 1¾ oz.
Baking-powder 1½ teaspoons.
Salt.
Milk to mix.
Sugar, 2½ oz.

Method.—Skin peaches and put in a layer in pie-dish. Add a little sugar and water. Make the scone-mixture, roll out ½in thick. Place over the peaches and bake in a hot oven.

PEAR GINGER.

5lb pears.
4½lb sugar.
1lb preserved ginger.

Method.—Cut up pears and let them stand over-night with sugar. Boil up with the ginger next day.

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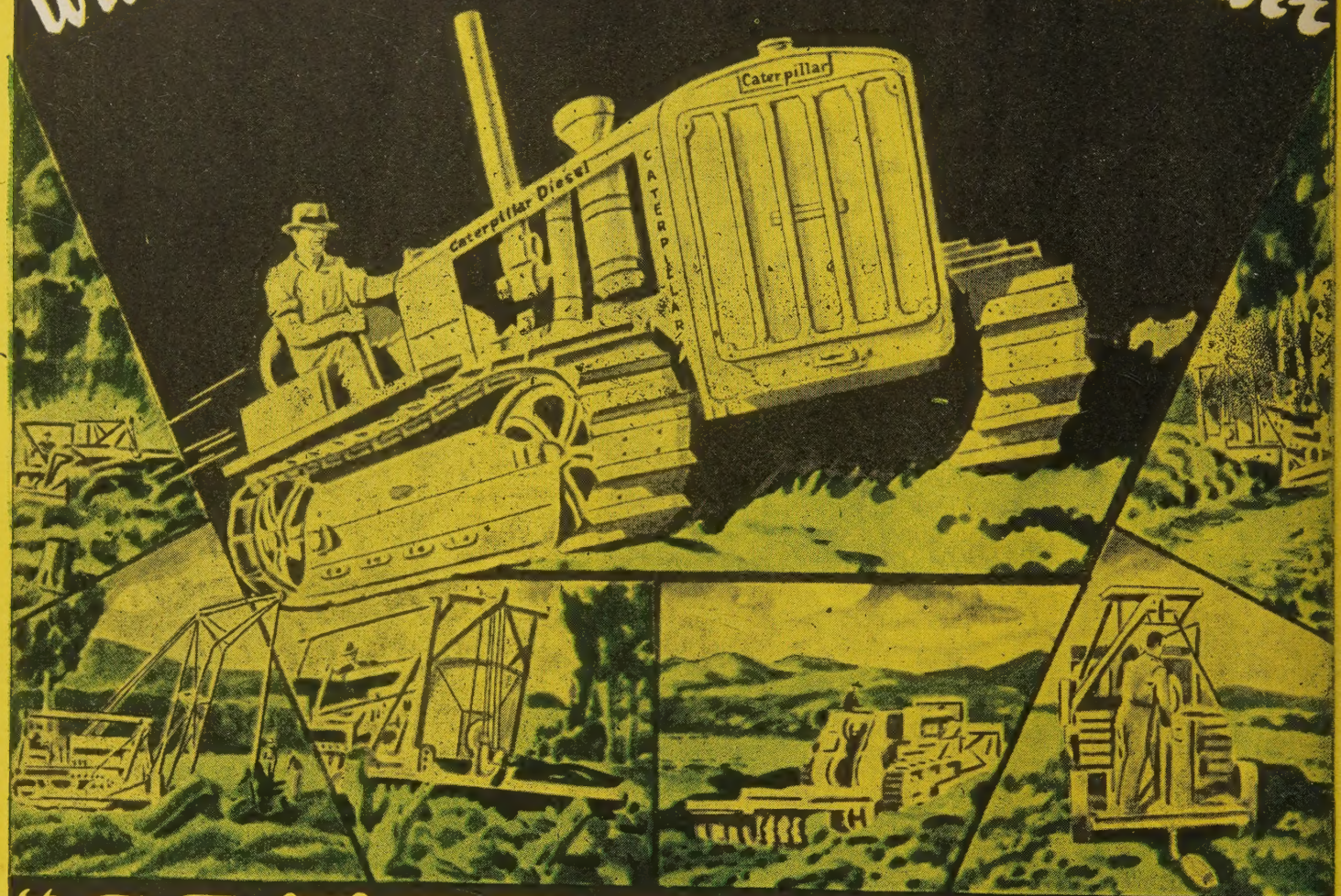

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